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ORIGINAL COMMUNICATIONS.

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LOOKING FORWARD.*

DR. ARTHUR B. DUEL, New York City.

Fellows and Guests of the American Otological Society:

It gives me great pleasure to welcome you to this, the sixtieth, annual meeting of the oldest society of Otologists in America.

On behalf of myself and the other members living in New York, I wish to extend our most cordial thanks to the Council for the honor they have conferred upon our city and our Academy of Medicine in selecting this place of meeting.

We feel justly proud of the facilities which this recently-erected building offers for the scientific and the social aspects of our conclave and we urge both guests and members to partake freely, not only of the intellectual pabulum which our programme provides, but also of our luncheons, today and tomorrow, which we hope will be equally delectable—and, may I add, equally digestible.

Dr. Harris, in his presidential address of last year, traced, in his inimitable way, the growth of this society from its inception; illuminating the picture with reminiscences of many men whom we all revere as outstanding characters in the field of Otology.

Since this was the picture in retrospect, "Looking Backward", as it were, it seemed not inappropriate that we should spend a moment today in "Looking Forward"—less certain ground, no doubt, but none the less interesting, since it gives each of us a chance to sketch as freely as we wish. And it is particularly interesting that each of us should pause on this occasion to look ahead for a moment,

*President's Address before the American Otological Society, May 19, 1927.

inasmuch as we have now added to our name an appendage which is significant. We are now the American Otological Society, *Incorporated*.

And just what is the significance of this appendage? Why have we burdened ourselves with this formidable suffix?

It simply means that we have assumed responsibilities which have made it necessary.

We were unable to function in this newly-assumed role without this legal process which binds us to carry out the responsibilities.

We have, as a body, undertaken a public trust and we have, as a body, sworn to administer that trust to the best of our ability.

Funds have been solicited by us with which to conduct researches in the field of Otology for the benefit of all mankind and we have pledged ourselves that these funds shall be faithfully administered.

There is something significant about this undertaking, sponsored by a national society, and, when one analyzes it carefully, the prospect is most inspiring, for it looks like efficiency raised to the *n*th degree.

Where else in the world will one find a body of the representative men in a field of medicine agreeing to co-operate in the solution of a scientific problem, each doing what he can; placing the results, as fast as they are determined, before all the others; all working for the common end, regardless of *who* places the banner of success on the completed structure?

That is what the American Otological Society is attempting with otosclerosis and other otological problems, and that is why the word "incorporated" has been added to its name, for, without the legal authority of incorporation, it cannot receive funds for such a purpose.

And looking forward to the successes with which such unselfish co-operative endeavor is bound to be crowned in coming generations, it is stimulating to feel that we have had a hand in building the substructure of such a monument to this society.

There is another thought on which I cannot refrain from speaking briefly in "Looking Forward" to the further expansion of this venerable society. It concerns the personnel of the membership.

I realize that I am rushing in "where angels fear to tread" but I am impelled to do so by a strong conviction that the time-honored policy of admitting to membership only those who have, in the opinion of the Council, published writings in Otology which have distinguished them, is likely to exclude a number of men throughout the country who would be valuable additions to the society.

I firmly believe that there are many large centres in this country which should be represented in the American Otological Society by the outstanding practitioners in those centres.

I believe that his fitness for membership should not in every instance be determined by the quality of the product of the candidate's efforts to swell the literature of Otology.

There are many men known to all of us who, as practitioners of Otology, have the confidence of the profession and the public in a way which makes them outstanding to much higher degree than many of their confrères who are more given to publishing their works.

Some of these men, while not prolific writers, are well versed in the literature of Otology. They would be glad to become members of this society and would be an addition, from their experience and knowledge of the literature contributing to the discussions, always lending an inspiring presence, and often wise counsel.

The importance of having representative men from all parts of the country is emphasized by this new responsibility we have assumed. It is not alone the research worker in the laboratory who is to help in this enterprise, but contact, through active leading practitioners, with the whole public is very important. Funds must be provided. Many a good idea has been buried for want of funds to carry it out.

I do not mean by this to advocate the idea that wholesale election to membership in this society is advisable, but I do mean that the Committee on Admissions should have the power to judge candidates by their *works* and make recommendations accordingly.

The policy that I would urge is a broader view of the qualifications for membership, combined with a jealous watchfulness on the part of the Committee on Admissions, that this shall not mean the careless admission of men who would not be a distinct addition.

I bespeak for this society always the premier position which it now holds as the senatorial body of Otology in America.

Once again I thank you for the great honor of acting as your president.

THE PROBLEM OF PROGRESSIVE DEAFNESS.*

The Hope of Its Solution by the Research Worker.

HENRY S. PRITCHETT, LL. D.,

President, Carnegie Foundation, New York.

The Carnegie Foundation has never pretended to a knowledge of the theory, of the science, or of the practice of medicine. Its studies have been altogether in the fields of medical education and research. Tonight I venture to offer a few remarks touching the relation of medical research to medical practice and the medical practitioner.

Research differs from the elementary studies of the beginner, not only in degree but in kind. It is the supreme effort of the human mind to advance the cause of knowledge. It must concern itself with a problem of real significance, it must be prosecuted by men who are familiar with the territory already occupied by science, and those who hope to serve in such a cause must make their venture in the spirit of science—that demands devotion, clear thinking, hard work, and absolute sincerity to face the facts.

Very few men in the active practice of medicine can hope to be great leaders in science, but every man in the practice of medicine may take an intelligent and fruitful part in its development. No better illustration of the interaction between the forces that promote medical art and medical science could be had than the opportunity now offered to your society for the conduct of a noble piece of research in a field of the highest importance to the health and happiness of human beings. That research cannot be carried on by a few men. Unless the great body of men of this society will interest themselves to co-operate with the committee under whose care the work is being done, unless they bring to the help of the committee specimens, methods and cases that come under their own observation, and unless they will bring to bear on the solution of the problem, not only the methods of the laboratory, but also the clinical vision that comes from practice, there will not be present those factors that will make for a victorious solution of the great problem you have undertaken. I venture to say that there is no other service which this group of medical men could render that would, in the long run, be more significant or more helpful than the hearty co-operation of all the members of your society in the important and far-reaching research which has been undertaken in your name.

*Abstract of Address before the American Otological Society, May 20, 1927.

THE PROBLEM OF PROGRESSIVE DEAFNESS.*

The Social and Educational Point of View.

ELMER ELLSWORTH BROWN, LL. D.,

Chancellor, New York University, New York.

It is a saying of the oculists that 90 per cent of our impressions of the outside world are those of sight, but the ear has made a fair race with the eye as regards its influence on the development of mankind. Early were the oral traditions, recitations and songs. Later were the orators, theatres, churches and presidential campaigns. Still later were the telephone and phonograph, and now we have the radio.

The strong cards of hearing are talk and music. To hear music and to share in the give and take of human talk, these are among the dearest things in life, and for these sources of intimate happiness we are dependent upon our sense of hearing.

Music is making great progress in the life of our people generally and in the public schools. Lowell Mason began it in the schools of Boston ninety years ago. In the nineties a host of supervisors of music in the East and West took up the work. In the early days of this century, high school orchestras became common and mechanical devices for the reproduction of music came into wide use in the schools. Since the great war, chorus singing in the schools and music memory tests have brought music home to all classes. It is typical of the wide range of human experience in which the emotional refinement of a people is peculiarly dependent upon the sense of hearing, and the approach to which, in the broad and large, is through the common school. On its humbler plane, the tragedy of Beethoven is repeated in the lives of thousands of children whose hearing is already impaired, and in those of other thousands in whom, unknown to themselves or to their teachers, the seeds of future deafness are already sown.

Our public schools, in the more advanced communities, are taking measures to meet this need. Provision has long been made for those totally deaf. But now other children whose hearing is so defective as to retard their advance in the studies of the schools, receive especial attention, sometimes in classes organized for that particular purpose. In many cases it has been found that children supposed to be mentally dull have given that appearance because of imperfect hearing.

America will use her wealth and the genius of her scientists to further research and accumulate knowledge to help the deaf child.

*Abstract of Address before the American Otological Society, May 20, 1927.

THE PROBLEM OF PROGRESSIVE DEAFNESS.*

The Otological Point of View.

DR. EDWARD B. DENCH, New York City.

Perhaps no more serious condition can attack those in early life than a progressive impairment of hearing. The failure of the power of audition in early life is frequently not recognized until it has made great advances. Beginning, often in childhood as well as in early adult life, this impairment of function advances so insidiously that it is seldom recognized until valuable time has passed, and the condition, even in favorable cases, is well beyond medical science. Perhaps it would be better for the patients if in the incipient stages the progressive impairment of hearing were more marked, for then the disability would be so noticeable that either the patients themselves or their relatives would insist upon attempting to obtain relief.

Many of the pathological changes which produce this symptom of progressive impairment of hearing affect at first one ear, then later the other. Nature has endowed the human subject with hearing far in excess of that necessary for the ordinary social and business relations of life. To put it differently, if the individual has one good ear and one very bad, the impairment of hearing is frequently not noticed until the involvement of the good ear becomes rather advanced. Those of us who have made diseases of the ear a life study frequently meet a case where the impairment seems to have begun not more than a few months, or at least a few years, prior to the time when we were consulted. Yet, upon examination, we find in many of these cases the hearing in one ear practically gone and the hearing in the other seriously impaired. This is not because the patient intended to deceive, or to give wrong facts, but simply because he was misled through the great surplus in hearing of his good normal ear. This normal oversupply of audition, if I may call it so, is undoubtedly responsible for the lack of prompt recognition of early auditory impairment in the majority of cases. I wish to emphasize the fact that this failure to observe unilateral auditory impairment is most common. It is not at all confined to the less intelligent members of the community, but is quite as noticeable in those in the higher walks of life. With superperfect hearing in one ear, almost total loss of function in the opposite ear may exist for many years and be discovered accidentally.

*Address before the American Otological Society, May 20, 1927.

I am not going to attempt, for an audience made up largely of physicians, but also of a goodly number of the laity, to go into any technical description of the various causes which may be responsible for the symptom under discussion. Roughly speaking—and I think it is due the audience that they should know something of what causes this symptom—roughly speaking, I say, progressive impairment of hearing may be due to one or two great causes. In the first place, the disease may start in that portion of the ear ordinarily known as the middle ear or conducting mechanism. It consists simply in the ability of this conducting mechanism to transmit the sounds to the deeper part of the ear; this is known as middle ear deafness, and is amenable to treatment, in a very large percentage of cases. This was made strikingly apparent in the decade 1860-1870 by Wilhelm Meyer, of Copenhagen, when he brought forward his work on the effect of the removal of adenoid growths in the nasopharynx as a factor in reducing serious impairment of hearing. At the time of his writing, I believe it is stated that cases of serious impairment of hearing in the young was reduced about 60 per cent over former years. This is ancient history to all present, but, thanks to his beacon light, all of these cases are now cared for. It remains for us to follow his example and aid the other cases.

In another set of cases, it is the belief of many that the disease starts and is always confined to the bony tissues surrounding the end organ of the auditory nerve; that these bone conditions develop from some constitutional cause, at present obscure; that they advance steadily, as a rule, although sometimes there may be a period of complete cessation of the pathological process and the unfortunate condition may not advance.

Thirdly, there are undoubtedly cases where the disease may start in the conducting mechanism, that is, in the middle ear, and then changes either resultant or concomitant may take place in the bony structures. There is also a class of cases in which the auditory impairment is due either to changes in the auditory nerve or in the central areas in the brain—excluding cases of tumor of the auditory nerve and of adjacent brain structures in which the presence of the neoplasm is of primary importance and the aural symptoms simply aid us in clinching the diagnosis. These cases are usually due to either a toxemia of the auditory nerve or to changes in the receptive areas in the brain, coming from either toxemia or, more usually, from vascular changes incident on advancing years. These cases, especially the toxic cases, are well worthy of study. Those due to senility should be promptly recognized and the patient, unless there

be some conducting lesion, should be advised to rely upon general hygienic measures for relief. Youth of the ear cannot be renewed, but good function may be conserved here as elsewhere by proper attention to hygiene.

There are many questions which it is necessary for the medical profession to decide upon, if progressive deafness is to be fairly met.

In the first place, it is essential that the research department have at its disposal a large amount of anatomical material, that is, of specimens. To this end your committee has sent out appeals to the various hospitals, requesting that, in each case where a patient comes to the post-mortem table, the temporal bone shall be preserved and placed in the hands of the committee for investigation.

You may say at once, why do we wish the temporal bones in cases that have no aural history? The reply is that we are not yet perfectly certain that the bony changes which occur in some of these cases may not be found in patients who have had no previous aural history. In other words, is the change in the bone invariably followed by an impairment of function in the organ, or is the change in the bone merely an accompanying factor? A large number of normal bones must be studied if we are to decide this question. In order to work to the best advantage, it is important that every case entering a general hospital shall have recorded upon the history whether or not there is any impairment of hearing, and, where there is an impairment there should be a careful test made and the results of the examination should be recorded. The making of a satisfactory record takes but little time, and, properly tabulated, it will be of great advantage. In this way the clinical history can be carefully checked up with the pathological findings.

Another very important factor is the question of heredity in progressive impairment of hearing. It seems to be a well established fact that given otosclerosis in one or the other parent, the effect upon the hearing of successive generations can be fairly well predicted. By otosclerosis I refer to that class of cases of progressive deafness where the conducting mechanism is normal and the symptoms are caused, or are supposed to be caused, by microscopic changes in the temporal bone. This hereditary factor, of course, immediately brings up the question of how far the physician is justified in advising against marriage in cases where one or the other of the contracting parties is suffering from this particular form of progressive deafness, or where there is a history of this disease in the family. All of us who have had years of experience have been obliged to advise against marriage in young adults suffering from this condition. It is a fright-

ful thing to be obliged to make a decision of this kind. But it is still more frightful to have a union of this kind take place and then be obliged to tell the parents that under no condition should they raise a family.

The question of heredity is so serious that the induction abortion is by many considered a justifiable procedure. The importance of solving this problem so that such a procedure will never be necessary should appeal to everyone. For the last twenty years, those changes in the temporal bone known as rarefying osteitis have been held responsible for otosclerosis. Now to what are these changes due? Heredity? Yes. But what was the cause of the first case of this kind? Has environment, diathetic conditions, perverted secretion of the ductless gland, caused these changes?

When we are confronted with these questions the problem naturally seems much broader and the field of investigation much wider than one would think when the words "chronic progressive deafness" are used to captionize the condition. An investigation of this kind must of necessity include the examination of a large number of normal temporal bones in order that variance from the normal unattended by symptoms may be classified. Then came the effect of general diathetic conditions, and general constitutional diseases which may possibly cause changes in the structure of the temporal bone without producing the classical symptom which we have always attributed to these changes. Tests as to variations from normal metabolism are important in conjunction with changes which may take place in temporal bones; also a lack or increase in the calcium content of the blood; the possibility of artificial production of these microscopic temporal bone changes in animals, subjecting them to various diets, endocrine secretions, increase or decrease of calcium in diet and their artificial infection by lues or tuberculosis. All are being borne in mind by those associated in this research, and laboratory experiments on animals are well under way.

This may give you some idea of the gigantic task which faces the committee, and the problems which we are attempting to solve. When it is remembered that the actual inception of our investigation is only about two years old and when you consider how busy your Research Committee must have been, you may perhaps understand why so little publicity has been given to this research until the present time. It is due to the public, deeply interested in this question, that they should understand what the committee has been doing for the past two years. Remember, that two years ago a certain sum was generously appropriated by the Carnegie Corporation for the study

of otosclerosis. The American Otological Society immediately conceived the idea of carrying on the investigation on a rather broader basis. Restricting the Carnegie Corporation grant to the investigation of otosclerosis alone, that is, that form of progressive deafness which is characterized, as far as we know, by certain definite changes in the perilabyrinthine osseous structures, they immediately took steps to raise a fund to be devoted to research which would include all causes of progressive deafness. Hence, the need of so much normal anatomical material as well as specimens from cases giving a history of progressive impairment of hearing due to any cause whatever.

The first step was to prevent any reduplication of effort, hence the literature of otosclerosis and of progressive deafness is being thoroughly abstracted in order to prevent much loss of time in the repetition of work. A complete index of otosclerosis and of cases of progressive deafness where this was the probable cause was the first work undertaken by the committee. This index is complete to 1926 and is being kept by competent secretaries fully abreast of the time, as current contributions are made. In addition to this, the committee has undertaken the collection, review and translation of all the literature bearing on the subject of otosclerosis, and this work has been completed to 1900. This literature is kept at the Research Bureau of the American Otological Society, Inc., at the New York Academy here, and is available to those who wish to consult it. Within the next year the work of collection, review and translation will be completed, and will be published and offered at cost to those who wish it.

All the hospitals in New York City and Brooklyn have been circularized regarding our investigation, and have been asked to co-operate with us in the furnishing of specimens and clinical histories. The responses to this circular letter are very gratifying, all the hospitals signifying their willingness to aid, and already some specimens have been received, despite the fact that our letter was sent only two months ago. Each hospital will later be given more specific instructions as to the removal and preservation of specimens. The committee has at its disposal enthusiastic young men who are ready to render service either in making histories or in attending to the technique of preparing specimens. This work in New York is of course but one step. All the hospitals throughout the country will be similarly urged to co-operate in this research.

At one of our sister institutions in a neighboring city, much work has already been done, thanks to the indefatigable efforts of the head of the Otological Department, and to substantial financial aid given

by one of our large foundations. With the generosity characteristic of the individual, the co-operation of this investigator with the Research Committee is assured.

Those who are not thoroughly acquainted with the difficulties of the investigation can hardly appreciate how much time must necessarily be spent before actual results can be obtained. Think, for example, of the fact that removing the temporal bone in a post-mortem examination must be carried out in such a way that no artefact is caused as a result of faulty manipulation; and all specimens must be decalcified—a process which alone takes about two months. One of the greatest difficulties which has confronted the committee is that we have so few men in this country trained to do this work. For this reason, a certain amount of work is being done abroad, through an arrangement with the committee, by Professor Wittmaack, of Hamburg. The Chairman of the Otosclerosis Committee, Dr. Pierce, than whom no one is more capable or more enthusiastic on this subject, is responsible for enlisting the services of Dr. Wittmaack.

The League for the Hard of Hearing has approached the question from another standpoint, namely, "The Relief of the Condition When Once Present." Our Research Committee will insist on working side by side with the League for the Hard of Hearing, and there can be no doubt that the Research Committee will be of great aid to the League on the one hand, and that the League will be able to be of great help to us on the other.

DOES VITAMIN-DEFICIENT DIET CAUSE DEAFNESS? RESULTS OF ANIMAL EXPERIMENTATION.*

DR. ROY A. BARLOW, Madison, Wis.

The interest in rickets that has recently been awakened, not only by those in the medical profession but also by the laity, has brought up the question as to the possibility of deafness resulting from this disease. Parents are asking the question with no little concern. Search of the literature yields little or nothing as to the probability of a relationship between rickets and deafness, so that it seems timely to add such data as are at hand to the present knowledge of the subject of rickets and disturbances of a vitamin-deficient diet.

Phillips and others, in the general survey of deafness, have centered their attention and activities in the child of pre-school age. Hess emphasized the general disturbances of children afflicted with rickets. Dean and Daniels called attention to the changes in the respiratory system and sinuses in children due to a lack of vitamin A. Lillie reports cases of intumescent rhinitis in children whose diet has been found impoverished of fats and green vegetables, and Shurly has had cases not only of children but of adults, with mucous membrane and blood changes that were directly traceable to a poorly balanced vitamin diet. It is natural and logical to suppose that other tissues than those mentioned may be disturbed or altered in a condition which so markedly affects the growing and developing child as rickets does.

The condition known as rickets is characterized by a loss of calcium in the long bones and of swelling of the epiphyseal juncture, as well as general lowered vitality. The disease has been carefully and accurately studied by the agriculturists in connection with other problems of stock raising. The most widely quoted authority in this work is Prof. Harry Steenbock, of the Department of Agricultural Chemistry, University of Wisconsin. He kindly supplied me with rats and other material which enabled me to carry on this investigation. Steenbock and his co-workers have standardized the diet and the changes of the long bone. The animals furnished me in this work were the same, or from the same litters and cages, as those on which other notations and results were obtained.

*Read at the meeting of the American Laryngological, Rhinological and Otolological Society, Atlantic City, May 26-28, 1927.

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Vitamin D in the diet is responsible for the deposition of calcium and its absence from the diet will produce a loss of calcium in the long bones. This suggests the question: Is the bony capsule of the internal ear affected in the same way? If the bony labyrinth is involved and a loss of calcium can be demonstrated, it might be assumed that some impairment in function of the inner ear would follow. Can the calcium content of the bony capsule be altered by vitamin-deficient diet? If so, is it a factor in the later development of so-called otosclerosis?

Vitamin A influences the changes in the mucosa of the respiratory region. Its withdrawal from the diet of an animal lowers its resistance to respiratory infection, produces edema of the mucosa and subsequent sinusitis, bronchitis and pneumonia. Vitamin A is found mostly in butter and other animal fat and is known as "fat soluble A." Vitamin B has some influence on the nervous system; its lack in the diet of an animal is followed by increased irritability and sometimes even convulsions develop. It is found most abundant in yeast. A deficiency of vitamin C produces loss of intercellular cementing substances, with loss of continuity of the tissue, especially the mucous membrane; this results in the breaking through or extravasation of blood into the tissue in petechial hemorrhages, as in scurvy, and it also produces marked xerophthalmic changes in the cornea of the eye. It is found mostly in fruits and fruit juice. Vitamin D has to do with calcium deposit and growth of bone and hair. It is found most abundant in cod liver oil and sunshine.

All these vitamins can be isolated in the laboratory; with rats of standard weight which are kept below standard conditions, the diet may be altered at will and any desired result produced to almost any desired degree; then by again adding the needed vitamin the animal thus affected may be restored to normal. Vitamin D is the vitamin which is most concerned in the present study.

The rachitic animal presents a picture of extreme weakness; the long bones are bowed and soft; the hind quarters are almost useless; there is roughening of the coat and abundant secretion from the nasal mucosa. All the skeletal bones are affected; in some instances the flat bones of the head are softened and they become misshapen. The thorax collapses. The spine crushes in of its own weight (Fig. 1), crowding the thoracic viscera even to the point of stenosing the esophagus and trachea and thereby embarrassing breathing and swallowing (Fig. 2.). The wrists and ankles become swollen to more than twice their natural size. The joints of the hands, fingers and toes are also swollen. In some instances the long bones have so little

calcium that the legs can be bent almost double without fracturing them. In fact, the entire picture is one of marked metabolic dysfunction. This is a severe degree of rickets and if it is associated with changes in the bony labyrinth they should certainly be apparent at this stage. In man, however, rickets could never develop to such a degree.

If the animal is exposed to ultraviolet light, or cod liver oil and raw milk are administered it will in a few days show improvement, lose its waddling gait, become more active, and run about quite normally. The watery nasal secretion will decrease, and the fur become smooth. If there is deformity of the long bone it is quite permanent, although the bone itself becomes as strong as it was before the change. There is a definite increase in weight.

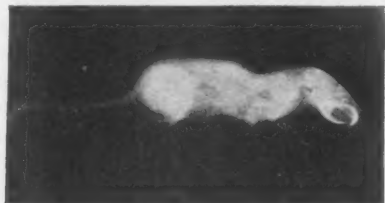


Fig. 1. Rachitic rat; kyphosis of spine; ribs scarcely discernible because of loss of calcium; wrists swollen, but bony capsule stands out clearly.



Fig. 2. Thorax of rats showing "rachitic rosary"; enlarged costochondral junctions.

In the laboratory the artificial sunlight or ultraviolet light are obtained from the quartz mercury vapor lamp. Steenbock has found that the rations can be exposed to ultraviolet light and the vitamin D content increased or activated, making the ration growth-promoting and bone-calcifying to the same degree as when the animal is irradiated directly. This activation takes place when the ration is irradiated in an open dish or in a stoppered quartz flask, but not when it is irradiated in ordinary glass bottles. The activation thus induced in the ration is not destroyed by subjecting it to vacuum, heating it at 96° C. for forty-five minutes or allowing it to stand twenty-four hours at room temperature.



Fig. 3.



Fig. 4.

Fig. 3. Section of wrist of rachitic rat; loss of calcium.
Fig. 4. Section of bony capsule of normal rat.

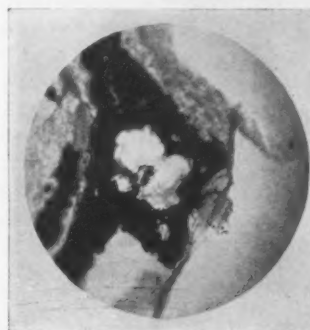


Fig. 5.



Fig. 6.

Fig. 5. Same as Fig. 4.

Fig. 6. Section of bony capsule of rachitic rat; no canalization; no loss of calcium.



Fig. 7. Same as Fig. 6.

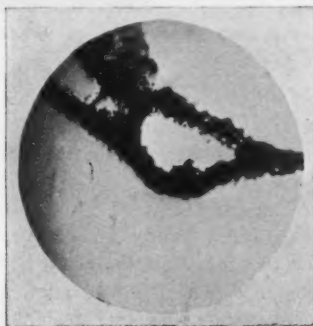


Fig. 8. Same as Fig. 6.

The storage of vitamin is greatest in a cholesterol substance and the liver is rich in cholesterol. Goldblatt and Soames found that liver from irradiated rats was growth-promoting and that liver from non-irradiated rats was not. The activity of liver from irradiated rats was not destroyed by drying the tissue at 96° C. for twenty-four hours nor letting it stand in stoppered bottles for two months.

Hess and Weinstock have shown that light, to be effective, must have a wave length not to exceed 3,030 or 3,120 angstrom units. Ordinary glass filters out all rays less than 3,300 angstrom so that



Fig. 9. Same as Fig. 6.



Fig. 10. Normal rat: no swelling of epiphysis of wrist; ribs clearly seen; bony capsule discernible.

no ultraviolet rays pass through. This is interesting, in that the solariums and sun porches in sanatoriums and hospitals are of little or no value as far as ultraviolet treatment from sun's rays are concerned.

The rats in my series were bred and raised in standard wire cages with screen floors. The cages were built in the basement of a building to which only the north light had access through ordinary glass windows, which do not admit ultraviolet light. The animals were selected from separate groups, litters and cages. They were raised

in the university animal colony on a ration composed of yellow corn, alfalfa meal, casein, oil meal, butter fat, bone ash and sodium chlorid; whole milk and tap water were fed freely. At the age of from twenty-three to twenty-five days the rats were weaned and put on a ration accepted and designated in the literature as Ration 2965 (Table 1). This consists of yellow corn 76 per cent, wheat gluten 20 per cent, calcium carbonate 3 per cent and sodium chlorid 1 per cent. It is a rachitic diet and will produce marked rickets in from three to four weeks. The changes in the animals are manifested by roughening of the coat, wabbling gait and inaptitude for any pronounced activity. There is a change in weight, due to the general nutritional changes (Table 1.). All the rats showed a gain in weight except when respiratory infection and affliction produced a decline, and in many instances death. The storage reserve of vitamin A, together with the vitamin A in the rickets-producing diet 2965, is not enough to furnish the animals with the required amount of vitamin A to prevent these infections longer than four or five weeks.

The rats when quite rachitic were killed with ether and chloroform and the temporal bones were immediately removed and sectioned. At the same time the wrist bones were removed and cleaned, and then studied as a gauge to the degree of bone changes. The changes in the radius and ulna were typical (Fig. 3). The loss of calcium was so great that the flat bones of the skull could be cut through easily with the finest embroidery scissors and the bones were so vascular that bloody fluid exuded readily.

The bony labyrinth was found to be hard and flint-like, as compared to the surrounding bone, and in some instances the labyrinth jumped out of place, much like a sequestrum, so that sections were obtained with great difficulty. Frozen sections of the temporal bones with bony labyrinth were made without chemical treatment; the sections were from 30 to 40 micra thick. They were first dropped into sterile water and then immediately into a tray containing a 0.5 per cent solution of silver nitrate. After a half hour they were removed and exposed for three minutes to a 75-candlepower Mazda lamp and then washed in 50 per cent alcohol for one hour: The silver was blackened by the light. The amount of silver deposited varied directly with the amount of calcium present in the bone, so that a fairly accurate quantitative estimation of the amount of calcium could be made.

Rickets is a disease causing an increase in canalization of the Haversian system. In the bony labyrinth there is an entirely different means of blood supply, as shown by Shambaugh. The bony labyrinth develops in mesenchyme and there can be no canalization.

The bony structure of the capsule is compact, hard and flint-like. It was just as hard and flint-like in the specimens from rats affected most severely with rickets as in those taken from normal animals (Figs. 4 and 5). The amount of silver deposited in the sections taken from markedly rachitic animals was the same as in those taken from normal or cured animals (Figs. 6 to 9). The amount of silver was judged by the amount of blackened film deposit.

Some of the affected animals returned to their normal activity after they had been fed cod liver oil (Table 2). The wrist bones showed evidence of cured rickets; the bony labyrinth was the same as the capsule in rachitic and normal animals. There appears to be no change in the calcium content of the bony labyrinth in the presence of rickets as demonstrated by the deposit of silver nitrate.

It must be borne in mind that this is not a microscopic study of bone structure; it is a comparative study of calcium content. The experiments were carried out to demonstrate whether a vitamin-defective diet producing rickets would cause a loss of calcium in the capsule of the internal ear and whether this might account for certain types of deafness, or at least be a factor in the deafness. The work was done carefully and accurately, but fails to show this connection; in fact, it demonstrates the opposite. Vitamin-defective diet does not cause a loss of calcium in the inner ear and subsequent deafness. It contributes certain laboratory data on which to base the assertion that deafness does not follow rickets.

Further study was made with the Roentgen ray. Roentgenograms were made of normal rats: spark gap 8 inches, distance 20 inches, time of exposure from $2\frac{1}{2}$ to 4 seconds (Fig. 10). Animals of all ages, from seventeen hours to maturity, were used to show the normal bony skeleton and the labyrinth. Roentgenograms were also made of rachitic rats and while lack of calcium was definitely indicated in the bony skeleton the bony capsule remained the same as normal; the density of the shadow was normal.

A valuable observation was also made relative to the functional activity of the inner ear. A loose screen attached to the door leading into the large room in which the animals were kept rattled whenever the door was opened, and the animals were accustomed to run to the little feed troughs when the attendants came in to feed them. They continued to do this without exception, regardless of how severe the rickets or how long its duration. Any unusual noise in the room, such as rattling of a tin pan or whistling, caused the animals to start and peer about. It seems evident that the function of hearing was not appreciably, if at all, impaired in the presence of rickets.

TABLE I.
Effect on Weight of Rats on Rachitic Ration 2965

Rat	Age, days		Weight, gm.		
	Initial	Final	Initial	Final	Maximum
6395	23	More than 51	63	104	104
6396	23	More than 51	56	88	88
6397	23	More than 51	63	108	108
6359	25	More than 88	62	77	105*
6360	25	More than 88	60	80	100**
6361	25	More than 88	58	72	95**
6362	25	More than 88	54	67	82**

*Sixty-seventh day.

**Seventy-fourth day.

TABLE II.

Effect on Weight of Rats on Rachitic Ration 2965, with Subsequent Diet Containing Cod Liver Oil, 2 Per Cent.*

	Dec. 9	Jan. 11	Feb. 10
Rat 41	63 gm.	88 gm.	102 gm.
Rat 73	65 gm.	107 gm.	138 gm.
Rat 89	63 gm.	88 gm.	108 gm.

*Rachitic diet was begun Dec. 29, when rats were 27 days old, and it was continued until Jan. 11, when rats were extremely rachitic. Then cod liver oil was given in diet and by Feb. 10 rats were cured and showed definite increase in weight.

SUMMARY.

A series of experiments was performed, which has extended over a period of two years, with the idea of ascertaining the relationship between rickets and deafness. The results are not confirmatory. They indicate that even in severe cases of rickets the calcium content of the bony capsule is not appreciably altered. In rats on a diet deficient in vitamin D there was no demonstrable loss of calcium in the bony labyrinth, although the long bones showed definite loss of calcium and increase in canalization. The comparative study of Roentgenograms of normal and rachitic rats showed no loss of calcium. This demonstrates that rickets is not an etiologic factor in deafness and there is no reason to believe that a child that has once had rickets is likely to become deaf because of it.

This, in a way, is a preliminary piece of work. It may be possible to develop a more accurate method of estimation of calcium content, perhaps an analysis of bone ash. It may be that other influences may be discovered which would result in loss of calcium in the bony capsule. The present work, however, is a beginning and has been of great interest to me.

CONCLUSIONS.

1. Deficiency in vitamin D in the diet does not cause loss of calcium in the bony capsule, as demonstrated by the silver salt.
2. The calcium content of the bony capsule is not affected by ultraviolet light or by cod liver oil.
3. The function of hearing is apparently not impaired by a vitamin-deficient diet.

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Jackson Clinic.

CIRCULATION OF THE ENDOLYMPH.*†

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The problem of the possible communications of the fluids of the internal ear with the other body fluids has been studied for as long as the presence of these labyrinthine fluids has been known. The experimental attack of the problem was by the general method of placing in the membranous labyrinth of living animals some fluid which could be left under conditions as nearly normal as possible for a time sufficient to permit it to be carried from the site of injection by any current present in the endolymph, and then, after autopsies at various time intervals, the location of the injected material was determined. Thus it was hoped to learn whether a flow does occur, and if so, what its pathway is.

The method of having two openings and injecting through one and permitting the endolymph to escape through the other was selected as offering a better chance of success than the method of withdrawal followed by replacement, through a single opening. By this method selected the trauma due to the production of excessive intralabyrinthine pressures during the injection can be minimized, if not entirely avoided.

For mammalia the most feasible approach to any part of the membranous labyrinth for the purposes of this experiment appeared to us to be through the external wall of the cochlear duct in the forms in which the cochlea projects markedly into the middle ear. The guinea pig was chosen. In this animal the width of the external wall of the cochlear duct, *i.e.*, the distance between the attachments to the spiral ligament of the basilar membrane and the vestibular (Reissner's) membrane, is approximately 0.4 m.m. in the lower turns. Since the location of this relatively narrow zone cannot be determined exactly from the surface of the bony cochlea in the living animal the use of holes as large as the full width would be almost certain to overlap in one direction or the other, but it seemed possible that if an attempt were made to drill holes of a diameter of not more than half the width of the outer wall of the cochlear duct, some of them should be so placed as to open into the cochlear duct without breaking through into either scala vestibuli or scala tympani. The question of

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a method of drilling such small holes in the cochlear wall offered some difficulties, since any drill with a diameter of but 0.2 m.m. would be too flexible if of a length sufficient to pierce the bony wall. Two things were found to answer the purpose; they are *a.* the smallest-sized dental reamers, and *b.* fine cambric needles with the points ground flat on two sides. The reamers were operated with a dental motor, and the needles were placed in rounded wood holders and used by direct rotation with the fingers. With both the drilling was stopped as soon as the end of the point pierced the inner surface of the bone sufficiently to permit the introduction of the tips of the glass capillary pipets which were used for the actual injection of the fluid. The smallest hypodermic needles are too large to use for this work. Sometimes the point of the drill completely pierced the spiral ligament and stria vascularis as well as the bone, and sometimes the final penetration of the soft parts had to be done with a glass pipet. Since by this method there was not an actual removal of the relatively thick layer of soft tissues, their collapse after withdrawal of the pipet aided in the closure of the injection site later. The hole in the bone was carefully filled with a suitable amount of bone-wax commonly used in surgery, and quite successful occlusion was routinely secured by this means.

A mixture of equal parts of potassium ferrocyanid and iron ammonium citrate in aqueous solution was the fluid selected for the experiments. Even when injected into the subarachnoid space in large quantities, Weed stated that a 1 per cent solution (0.5 per cent of each) of these salts is nontoxic, so that for the minute amounts that can be used in the labyrinth the possible toxic effects are negligible. A 1 per cent solution was used in all but four animals with which a 4 per cent solution was tried. This stronger solution is, of course, quite hypertonic and its toxicity unknown.

The animals were killed at intervals of from forty-five minutes to forty-four hours after the injection by an overdose of ether. Fixation was by either 10 per cent or 20 per cent formalin, to which was added either 1 per cent or 2 per cent hydrochloric acid to cause precipitation of ferric ferrocyanid (prussian blue) from the injected fluid. Paraffin embedding was used. Serial sections of the entire labyrinth were made, usually at twenty minutes. The plane of sectioning was approximately horizontal and as nearly parallel to the modiolar axis of the cochlea as possible. Carmine was selected for staining.

The most striking fact observed upon study of the material is that in 16 out of the 21 cases studied with the microscope there are prus-

sian blue granules not only in the lumen of the saccus endolymphaticus, but also in a certain part of its epithelial wall. The part in which they are located is that which I have described as characterized by the presence of a columnar epithelium, crypts and processes, with a subjacent well-vascularized areolar tissue and for which I have suggested the term "pars intermedia of the saccus endolymphaticus proprius." The granules are present in the epithelium of both the crypts and the main part of the wall of this region. In most of these labyrinths there were also granules in the lumina of the canalis reuniens, the sacculus, and the ductus endolymphaticus, as well as in the lumen of the saccus endolymphaticus. Even without this evidence of the route taken to reach the saccus wall, the only plausible explanation for the presence of the prussian blue granules in the epithelial wall of the pars intermedia in so many cases is that the injected fluid has passed, without continued injection pressure, from the ductus cochlearis through the canalis reuniens into the sacculus, and from this through the ductus endolymphaticus into the saccus endolymphaticus, where it has passed into the wall of a portion which is morphologically differentiated from the rest of the membranous labyrinth. That the injected fluid was passing through the wall, rather than simply into it, seems probable from the fact that the areolar tissue surrounding this part of the wall contains numerous blood vessels; but the direct evidence on this point is very scanty, since there were blue granules present beneath the epithelium in only four cases, and in only two of these was the small amount observed near blood vessels.

The hypothesis which best explains the experimental observations just recorded is that the endolymph in the guinea pig flows from the region of the cochlear duct toward the endolymphatic sac via the intervening parts of the membranous labyrinth and that the wall of the pars intermedia of the saccus is a region of outflow of the endolymph, and that the injected fluid was carried along with the endolymph.

Besides the cells which are a normal content of the saccus, there were also frequently present in these operated labyrinths red blood cells, which from their distribution one readily accounted for as being from the hemorrhage at the injection sites. Only an actual movement of the fluid in the membranous labyrinth can account for the transportation of these cells to the saccus.

The lumen of the cochlear duct still contained in most of the animals at the time of killing a sufficient amount of the injected fluid to yield prussian blue granules upon fixation; this indicates that

the rate of flow of endolymph away from the cochlear duct is rather gradual and agrees with the fact that three of the negative cases for the wall of the saccus are in the group of relatively short time intervals.

The theory that can be drawn from these conclusions is briefly as follows: Endolymph is formed by the stria vascularis of the cochlear duct, flows toward the basal end and through the canalis reuniens into the sacculus and from this through the ductus lymphaticus into the sacculus lymphaticus endolymphaticus, and leaves the membranous labyrinth by passing through the wall of the pars intermedia of the saccus into the numerous small blood vessels of this region.

Johns Hopkins University.

EARLY DEVELOPMENT OF THE BONY CAPSULE OF THE HUMAN EAR.*

DR. T. H. BAST, Madison, Wis.

Preliminary Report. This report consists of a demonstration of two models of the internal ears of two human embryos aged 17½ and 19½ weeks, respectively. Serial sections of a 16-week embryo ear were also demonstrated. The models made possible two interesting observations:

1. The first ossification centers occur at the origin of the cochlea and the points where the branches of the vestibular nerve enter the ampulla of the semicircular canal. The ossification center around the posterior canal ampulla and the one at the origin of the cochlea soon unite to form an incomplete ring of bone around the fenestra rotunda.

2. While the above-mentioned centers lie closely to and partly around the fenestra ovalis they are formed independently and are unrelated to the formation of the oval window. At the time when the ossification process has extended all over the capsule there still remains an area of unossified cartilage between the foot-plate of the stapes and the bone in the region of the first ossification center.

*Abstract of report read at the meeting of the American Otological Society, May 20-21, 1927.

RESUME OF REPORT OF THE BUREAU OF STANDARDS UPON AIDS TO HEARING.*

DR. D. HAROLD WALKER, Boston.

It has long been the dream of certain otologists that the time might come when there would be certain definite information, based upon scientific investigation, to aid in the proper and rational prescribing of an artificial aid to the hearing of deafened patients. It is through the efforts of the American Federation of Organizations for the Hard of Hearing that such information is being secured, which will soon be in the hands of the profession.

In order to inform those who do not know the breadth of the work of this federation, and the scope of its constituent organizations scattered throughout the land, I will quote the lines which appear upon the letterhead. "To act in the national and international fields of social work for the deafened; to encourage the founding of local organizations; to properly carry on national propaganda in the interest of the deafened and in the prevention of deafness."

The president, Dr. Gordon Berry, two years ago appointed a committee of three to obtain some disinterested body to make a survey of the more common aids to hearing, and to report to the federation. This paper is only a preliminary one, for the purpose of telling the profession that the work is nearly finished and that the data will be fully edited in a short time, rather than given as a detailed report of the efficiency of the individual instruments themselves.

The committee consists of Dr. Douglas MacFarlan of Philadelphia, chairman; Dr. E. P. Fowler of New York, and Dr. D. H. Walker. It is only right and just to say that Dr. MacFarlan has done all the work. This committee has obtained the endorsement of the leading otologists and national societies in the country as well as the official endorsement of the American Medical Association, the American Otological Society, the American Triological Society, the American Academy of Ophthalmology, Otology and Laryngology, and the American Homeopathic Ophthalmological, Otological and Laryngological Society. The program of the work consisted of:

1. A questionnaire to the hard of hearing.
2. A physical survey of instruments.
3. A clinical survey by otologists.

An acknowledgment is here made to Miss Peck, of the New York League, and to Miss Magoun, of the Philadelphia League, for the

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tabulation of some three hundred letters received in reply to the questionnaire. I will give but a few facts elicited by the questionnaire, to show the extent of the use of an aid to hearing by the deafened, the age of those affected, and the number who use lip reading.

Number of replies, 233; number using some aid, 212; number using lip reading, 152; age 10-20, 4 7per cent; age 20-40, 18 per cent.

There are other interesting facts which will appear in the full report.

The committee feels that it is most important to mention some of the disagreeable features shown by the nature of the replies. In a large percentage of the letters there are complaints against unethical treatment by those selling hearing aids. Encouraging advertisements prey upon the ever present hope which the deafened have, and as a result another aid is purchased, as many as five or six being bought during a lifetime. It is probable that these people cannot be helped by any machine to the extent they expect. Certain of the deafened should realize this. Advertisers should be forced to correct misleading statements. Many manufacturers are unwilling to allow a free trial of their instrument. A deposit of a small sum could be made which would apply on the cost of the instrument, if bought.

To make a physical survey of aids to hearing, the committee successfully solicited the help of the U. S. Government Bureau of Standards. A circular letter was sent to the manufacturers and agents of every known instrument upon the market. Instruments were, at first, submitted by only a few concerns, and two follow-up letters were sent. As the survey progressed, more and more concerns submitted instruments, and, being late in doing so, added considerable inconvenience and delay to the work.

Instruments for the use of the deaf may be broadly divided into two classes, electrical and nonelectrical. The nonelectrical devices are various types of ear trumpet, speaking tube or auricle; the latter being either single or double. The electrical devices are all some form of telephone system, in two cases submitted including a small vacuum tube amplifying set.

Hearing aids call for the consideration of two fields of study: 1. The complexities of the sounds sought to be heard. 2. The acoustic characteristics of the aids themselves.

1. As hard-of-hearing persons are most concerned with the hearing of the voice, it is well to outline the acoustic features of the spoken voice. Its range is between 300 and 3,000 double vibrations, that is, spoken language is a complexity of pitches or frequencies

lying in this tone range. Thousands of these various pitches are presenting themselves to the auditory perception almost simultaneously; most of them must be heard to some degree, to be able to interpret speech as such. Deafened persons are prone to hear more poorly in certain pitch regions than in others. This causes distortion of sound, a common experience of the deafened. That it may be understood how complex is the nature of speech, there is given as an example the presence of 16 important frequencies or pitches, appearing instantaneously when the vowel "a" as in "father" is uttered. The range of the greatest hearing acuity corresponds with the range of the voice.

The above generalities are set down for the sake of those unfamiliar with the simpler acoustic facts, in order that this report, which may have general circulation, may be more useful.

2. *The acoustic characteristics of the aids themselves.* (a) *Non-electrical aids.* When a body is exactly in tune with a generator of sound, that is, when it is in resonance, it may take up vibrations with great ease and vigor; such a response is often called sympathetic vibration. Resonance may be described as the tendency to vibrate in harmony with a generated sound from without. Resonators, on account of their design, vibrate more freely to some sounds than to others. They may dampen or suppress some of the frequencies presented to them. The nonelectric aids are designed that they may: 1. catch sound; 2. suppress undesirable noises; 3. reproduce in greater magnitude, by means of resonance, those sounds which we wish to hear. These sounds must be amplified, as nearly as possible, in the same proportion as they are presented to the instrument. The perfect amplification of speech, by hearing aids, will probably never be reached, but some of the resonators are better than others. As a rule, perfection can be approached more closely, as the resonator is made larger. The material of which the aid is constructed is of considerable importance in the character of the sound produced; for example, wood and vulcanite are better than tin.

The speaking tube comes in a class separate from the other non-electrical aids. Its effect is as if the user was speaking directly into the ear. The tube walls prevent the dispersion of sound, and allow the direct force of the voice to be exerted in the ear, via the small column of air.

(b) *Electrical aids:* The electrical or telephonic aids have their acoustic characteristics dependent largely upon factors related to diaphragms. Diaphragms are known to be peculiarly selective of one pitch, to the sacrifice of others, and much depends upon the diameter,

the thickness, the material, the effect of clamping and the mode of mounting.

The minute granules used in the transmitter are greatly influenced by the collection of dust; the electric magnets in the telephonic circuit are subject to demagnetization; the batteries run down; insulation of the wires wear; the terminals connecting the wires to battery, receiver or transmitter are prone to come loose. These generalities refer to practically every make.

Although the amplification of one pitch in particular tends to make distortion, the greater amplifying of all the pitches make the telephonic aids much more satisfactory to most of the deafened than are the nonelectric aids.

In the practical application of all such devices of either class, three factors are to be considered; perfection of articulation, intensity and introduction of noise or rattle. Articulation is by far the most important quality in the successful functioning of a device for the average run of deaf persons. We frequently hear such persons say, "Do not shout, it makes my ears ring. Raise your voice moderately and speak distinctly."

The test employed for articulation was that used by the Bell Telephone Laboratories in testing telephones. Its application to telephone sets for the deaf is obvious, but the method is perfectly general, and is applicable equally well to nonelectric devices.

The test requires two operators and list of test syllables. About 8,000 syllables were constructed, involving the following combinations: *a.* Consonant followed by vowel; *b.* vowel followed by consonant; *c.* consonant-vowel-consonant.

These syllables were then checked over, and those likely to give trouble due to memory effects were as far as possible eliminated. Each of the syllables finally chosen was then written on a card so that the lists could be shuffled. Each test was made with a list of a hundred syllables drawn at random.

In a quiet room one operator puts on the appliance to be tested, and (if it is adapted for one ear only) closes the other ear with his finger. The second operator reads the list of syllables at a steady rate of one syllable per second (or slower if found desirable). The listener repeats each syllable as he hears it, and the reader lays the card on one of two piles, as the listener repeats them correctly or incorrectly. Suppose 75 of the 100 are correctly heard; the 25 incorrect syllables may be due in part to defective hearing of the listener, rather than to imperfect articulation in the instrument. To allow for this the list is read again, after shuffling the cards, and the

listener, without the aid of the instrument, repeats the syllables as he hears them. Suppose he catches 85 correctly; then the ratio of 75 to 85, or 88 per cent, is taken as the measure of the articulation of the instrument.

It should be noted that articulation tests of this nature are of little value if confined to a single reader and listener. For this reason, after a record has been made as above described, the reader and listener changed places and repeated the test.

The necessary limitations of accuracy of this method of testing articulation are such that any instruments rated in the following report at 90 per cent or over may be considered as perfect for all practical purposes.

Since normal hearing fails to catch a syllable now and then, it is conceivable that an instrumental device might so improve matters that its articulation might be over 100 per cent.

(c) *Tests for intensity:* In considering the intensity of sound transmitted to the ear by any device, we must recognize in the first place that a distinction is to be drawn between the actual physical intensity of the vibration of the air, and the effect produced by it in our consciousness. As the intensity of a sound increases, the ear seems to protect itself against it by some mechanism not yet understood, so that the response of the ear is not proportional to the intensity of the stimulus, but rather to the logarithm of the intensity. For example, a sound just at the threshold of audibility is fairly to be rated at intensity 0 as far as the ear is concerned; but because vibrations of still feeble intensity may exist, all of which are inaudible, the physicist calls the threshold intensity 1, and to feeble vibrations are assigned fractional values all the way down to perfect stillness in the air, which of course is zero on the physical scale.

Vibrations possessing 10, 100 or 1,000 times the physical intensity of the threshold unit will produce effects upon the ear roughly proportional to 1, 2 and 3, which are the logarithms of 10, 100 and 1,000.

A similar protective mechanism has long been recognized in the eye. If we pass from a dimly lighted room to one which is, say, a hundred times as brilliantly lighted, the optic nerve is by no means a hundred times as strongly stimulated. The pupil of the eye contracts and the visual purple rapidly bleaches out of the retina, so that the resulting effect on the nerve does not keep pace with the increase in the intensity of the light.

The practical effect of this principle as applied to devices for the deaf is that it is unprofitable to attempt to push the intensity factor too far. The expense rises more rapidly than the result obtained.

In addition, it is very difficult to void the introduction of noise with highly magnified intensities, so that these powers are for the most part as useless as the high magnifying powers of an astronomical telescope, which can be used only under exceptionally still atmospheric conditions.

Tests for intensity upon the instruments submitted were carried out in two ways. One method involved the use of a set of tuning forks of pitches varying from 256 to 1,024 cycles per second, and was applied to all the nonelectrical devices submitted. Forks of different pitch were used for the purpose of obtaining such information as might be possible regarding dependence of intensity on pitch.

Suppose we have a device which intensifies the sound received by it; it should be possible to hear, by the aid of this device, the note of a tuning fork for some time after the vibration has ceased to be audible to the unaided ear. And if the device reduces the intensity, it should be possible to hear it for a longer time without its use.

In applying this method to any device, two operators and a stop watch are required. The first operator holds the watch, sounds the fork and holds it at a certain distance from the ear of the second operator. (The sound shadow of the head is usually sufficient to prevent the fork being heard by the other ear of the listener). When the listener fails to hear the note of the fork, he signals by starting to place the instrument under test to his ear. The first operator then starts the watch and moves the fork away to permit the listener to put the instrument to his ear. The first operator then holds the fork, still vibrating, at the same distance from the mouth of the instrument as it was held from the ear. This change can be made with a little practice, in not over one second. The time occupied in changing is unimportant, the watch being started at the given signal of commencing the change.

The listener will now hear again the note of the fork, due to the magnifying power of the instrument. When he again fails to hear it, he signals, and the first operator stops the watch.

The time intervals thus obtained with different forks will vary considerably, partly due to the different damping constants of the forks. These damping constants were determined by a special experiment, and the relative time intervals reduced to a basis which is comparative.

This method works quite satisfactorily with nonelectrical devices which are usually practically free from noise, but it is not so satisfactory with electrical devices which almost always introduce more or less noise or rattle, which prevents the accurate determination of

the threshold instant of time. An approximate idea of the magnifying power of such devices for moderately loud sounds was obtained in the following manner:

As a source of sound a telephone receiver was used, actuated by alternating currents of frequencies in the neighborhood of 256,435, 512 and 1,024 cycles per second, obtained from oscillating vacuum tube circuits. The intensity of the sound produced by the telephone was regulated by adjusting the strength of the current so that the sound became imperceptible to the ear when the telephone was removed to a distance of about 1 foot.

The telephone was then placed close to the transmitter of the device under test, but separated by a rubber washer, so as to minimize the transmission of sound by conduction through contact. The intensity of the sound produced in the receiver of the deaf set was estimated by holding it at increasing distances from the ear, or, for high magnifying powers, walking away from it, the operator being always at a distance of several feet from the source, which, of course, would be then imperceptible to him.

While some very high magnifying powers were found in certain of the instruments tested, attention must be called to the fact that for the most part these high powers were practically useless because of the noise accompanying them and, in many cases, because of a tendency to fall into squealing or howling.

Even though some devices afford little magnification, they may still serve a useful purpose. In some forms, the transmitter, provided with a long cord, may be handed to the person to whom it is desired to speak, thus practically bringing the mouth of the speaker to the listener's ear. The same is true of speaking tubes, which actually diminish the intensity somewhat; yet the gain by practically bringing the speaker close to the ear outweighs this diminution.

Six makers submitted nonelectric devices consisting of speaking tubes, simple and double auricles. In all the instruments the articulation was excellent, but owing to the absorption, especially in the speaking tube, less energy was delivered to the ear than was taken in at the mouthpiece. Even with the loss of intensity, the tube has the advantage of bringing the speaker's voice nearer the ear. In certain of the auricles, the resonance was so great as to preclude tests. In the greater number of them, the tests did not show them to be of any special advantage over the ordinary voice. In one, however, there was a decided increase in intensity.

The tests of the electrical instruments were carried out using two operators, one of whose hearing was especially acute and the other

having a moderate degree of deafness. Eight different companies responded. The clearness of articulation varied greatly with different makes. In two instruments it reached 90 per cent. The ratio of distances which the test sound was heard varied from being heard 1 foot distant or as 1:1 to 20 times the test sound, or 20:1. There is no doubt but that the electric devices can be made efficient and may be of great aid to the deafened person if the instrument is properly chosen.

Most manufacturers, especially of the better instruments, now seem anxious to co-operate with the federation in developing business and using ethical advertising.

These instruments used in the survey are being deposited in the Army Medical Museum as an open collection, to which will be added newer makes as they appear.

A complete file of hearing aid literature is on hand at the Volta Bureau, 1601 35th street, Northwest, Washington, D. C.

101 Bay State Road.

RADIUM IMPLANTATION IN ESOPHAGEAL CANCER. DESCRIPTION OF OPERATING ESOPHAGOSCOPE: TECHNIQUE OF APPLICATION.

DR. JOSEPH MUIR, New York City.

According to the latest statistics on malignant disease, there are at present in the United States about two thousand persons suffering from carcinoma of the esophagus. Nearly all of these are men in later middle life, not young, yet in the normal course of events still entitled to many years of life and usefulness. To such individuals, even though they are attainted with a very grave disease, it would seem that the medical profession should be in a position to hold out some hope of cure, or, at the worst, substantial alleviation of their distressing condition. The past ten years have witnessed tremendous progress in the successful treatment of all forms of cancer—that is, all forms but one—that one being cancer of the esophagus! The victims of this form of malignancy resemble the prisoners confined in the death-house. The situation of other inmates of the prison is

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serious enough, but by no means irremediable; only over the doors of those few is it written: "All hope abandon, ye who enter here!"

The reasons given by cancer therapists for their failure to do anything for the patient with a malignant lesion in the esophagus are, indeed, perfectly adequate. To anyone familiar with the subject it is superfluous even to enumerate them, and they are equally applicable, whether surgical measures or some form of radiation constitutes the treatment contemplated. Far advanced condition of the lesion when first seen, inaccessibility of its location, impossibility of estimating its dimensions and rate of growth—they are all evident, and up to the present apparently unanswerable. The medical profession has come to feel that the problem presented by this particular neoplasm faces them like a blank wall, and because of the pessimistic attitude thus engendered, has actually become indifferent, merely marking all such cases "incurable," and consigning the patients to death without any hope of respite.

I am, therefore, raising my voice to plead the cause of this small band of sufferers in whose behalf practically the entire medical profession continually keeps silence. The spectacle of men dying in the agonies of slow starvation, frequently made increasingly horrible by the prospect of strangulation by involvement of the larynx, would seem to be one calculated to arouse even the most lethargic to action. It has, to be sure, called forth in the past the utmost endeavors, not only of surgeons but of radium therapists also, but the efforts of all these workers have been so uniformly unsuccessful that one after another every hopeful voice has been stilled.

Three prime drawbacks to radium therapy of esophageal cancer have always existed; first, the difficulty of placing the radium accurately; second, the practical impossibility of maintaining it in position long enough to be effectual, and finally and more than all, the great danger of burning the tissues, which will induce sloughing and fistulae into the mediastinum, an accident bound to have very shortly fatal consequences.

To obviate these difficulties, the technique about to be described has been elaborated, for the proper carrying out of which certain modifications of the existing types of esophagoscopes have been found necessary. Fig. 1 is a top view of the instrument with the suction tube, radon seed-implanter and elevator removed. The lamp *a* and shield *b*, indicated by dotted outlines, are placed so near the center of the main observation tube *c*, that parallel rays of light effect a good illumination of the operating field, this light being still further intensified by the lens *h*, which may be used in conjunction

with a high candlepower incandescent lamp. This powerful lamp is so placed, however, that it does not generate the heat which is so often a drawback to the employment of the distal end illuminated type of esophagoscope.

Fig. 2 affords a side view of the instrument, showing in detail the radon seed implanter *d*, suction tube *e*, and elevator *g*. The implanter is of the flexible, cystoscopic type with the upper end gradu-

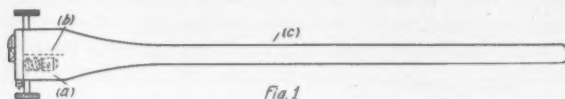


Fig. 1

Fig. 1. Top view. Observation tube (c); suction tube, radon seed implanter and elevator removed. Lamp (a) and shield (b) indicated in dotted outline.

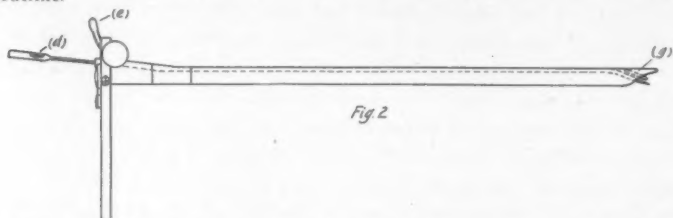


Fig. 2

Fig. 2. Side view showing details of radium emanation seed implanter (d), suction tube (e), and elevator (g). By means of the suction tube the operative field is kept clear for observation, while the elevator directs the angle of the needle point of the implanter, thus facilitating exact placement of the seeds.

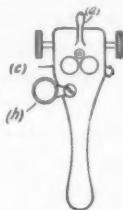


Fig. 3

Fig. 3. End view showing removable lens (h) which slides over observation tube (c) when magnification of the field is desired.

ated in centimeters so as to indicate the depth to which its needle extremity has been introduced into the tissue. The elevator *g*, which is also of the cystoscopic type, serves to direct the implanter so as to insure the accurate insertion of the platinum radon seeds at the periphery of the lesion.

Fig. 3 is the end view of the instrument, showing the removable lens *h*, which slides over the observation tube *c* when magnification

of the field is desired. By means of the suction tube *e* the operating field can be kept clear for observation.

Technique: 1. A removable platinum radon seed is placed in the loading-slot of the implanter, the thread attached to the seed having been cut to a length exceeding by 2 c.m. the depth at which the seed is to be implanted. The plunger of the implanter is next introduced into the lumen, pushing before it the seed until it has reached a point 4 or 5 c.m. from its needle extremity.

2. By means of the elevator the implanter is directed to the site selected for the first puncture and introduced to the depth to which the seed is to be deposited. The seed is inserted in the tissue by pushing the plunger "home."

3. *Important:* The plunger is withdrawn from the implanter.

4. The implanter is slowly withdrawn from the puncture channel, permitting the seed thread to disengage from the instrument and remain hanging from the portal of entrance, thus helping to gauge the distance at which the next puncture is to be made for successive implantation.

5. The implanter is reloaded as in 1 and the technique repeated.

The entire procedure is much facilitated if done under the fluoroscope, as this enables one to check the esophagoscopic observations. If, for example, by inadvertence the needle is not placed at exactly the proper angle, this will be quickly seen, and the point withdrawn and reinserted in the precise position required. The trauma caused by the entrance of the fine needle point is negligible.

So far six cases have been treated by this method, and though the work has been done far too recently to make possible final deductions as to its permanent value, the progress and present condition of all the patients is most encouraging and satisfactory, and their cases will be reported in detail from the different clinics where they are under treatment. But it is to be hoped that the results so far obtained will encourage those under whose care cases of esophageal malignancy may come to hold out some hope to these despairing sufferers. The relief already afforded surely warrants a wider application of the method even before the required five-year period necessary for definite confirmation of final results has had time to elapse. Within that five years hundreds of esophageal cancer patients will die unrelieved. Would it not be better to offer them palliation and extension of life in reasonable comfort, even though we are not yet able to assure them of positive and permanent cure?

250 West 57th Street.

MALIGNANCY OF THE LARYNX AND ESOPHAGUS TREATED BY RADIUM EMANATION.*

DR. FRANK RICHARD HERRIMAN, New York City.

Malignancy of the larynx or esophagus has long been a source of much vexation and dissatisfaction to any therapist who endeavored to combat it. In only a few cases could surgery be applied with any hope of success, and other curative measures which were essayed from time to time, were even less satisfactory. Soon after it was known that radium possessed powers useful in the struggle against malignant disease it was eagerly applied to the larynx and those cases of esophageal cancer in which it was possible to make use of it. But the results obtained, although in a few cases good enough to hold out some measure of anticipation of even greater success when improvements in technique had been made, were on the whole even more disappointing than those following surgery. Gradually those who had most hopefully given radium a thorough trial reluctantly admitted that it had disappointed them, and in many institutions where treatments had been given, the practice was practically or entirely abandoned.

The difficulty most of the workers admitted quite candidly, lay in the methods of application. The procedure in all clinics was very similar. Either the radium was applied in a plaque which was placed upon the external surface as directly above the lesion as was possible, or it was enclosed in a suitable container, and hung in the throat upon a cord, dangling as close to the affected area as the operator was able to gauge it. In both these procedures the actual amount of radiation received by the lesion was largely guesswork and much healthy tissue was also included in the radiated area, with distressing unfavorable reactions as a consequence.

A little later unscreened capillary tubes and platinum needles containing radium emanation were employed in laryngeal and esophageal work, but the results while somewhat better always proved disappointing in the end. The experience at the Post-Graduate Hospital, New York, was similar to that of other institutions throughout the country. Under Dr. Henry H. Forbes the various forms of radium treatment then in vogue were given an extensive trial, but none of them proved of sufficient value to be permanently retained.

*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, Dec. 22, 1926.

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and at the time I took over the service last August, the use of radium in the nose and throat department had been almost entirely given up

The majority of laryngeal and esophageal cancers do not appear at the clinic until they are much too far advanced to make any form of surgery, other than a tracheotomy, admissible. These patients are usually destitute, having spent all their money on "throat treatment," which has proved far worse than useless, and in most cases are in a most pitiable condition. Once the diagnosis has been established by thorough examination—often an exhausting and distressing ordeal—there was nothing to be done for them save to recommend them for treatment to an institution giving special care to malignant cases, and in many instances the delay thus unavoidably occasioned the patient had a fatal result. I was extremely desirous of offering some aid to these unfortunates, even if it could be nothing more than palliation, and learning of the method of implanting radium emanation in removable platinum "seeds" which had originated with Dr. Joseph Muir, of New York, I determined to give it a trial. With the co-operation of Dr. Muir and the invaluable aid of Dr. Manfred J. Gerstley, I implanted a number of the most advanced and desperate cases, and our immediate success has been so great that I feel justified in giving a brief summary of the results, even though the time elapsing since the treatment was instituted is far too short to admit the drawing of definite conclusions.

Case 1: J. P., driver, age 48 years, user of tobacco; history of chancre twenty years ago. Mother died of cancer of the stomach. Hoarseness and difficulty in swallowing had been noted for three months before the original examination. The tentative diagnosis was cyst of the epiglottis, and a tracheotomy was done June 5, 1926. Biopsy demonstrated the growth to be squamous cell carcinoma. The man returned to the clinic in September, at which time an ulcerated mass filled the larynx, extending to the right pyriform sinus, and seriously interfering with deglutition; the voice was entirely gone.

On Sept. 23, 1926, eight platinum radon seeds were implanted, the total radiation amounting to 2,666 millicurie hours. When the patient returned within two weeks the larynx was entirely clear, the mass having disappeared. On Nov. 4, three more seeds were implanted, giving a total of about 1,000 millicurie hours' radiation. The tracheotomy tube was still in place, but the patient could speak well enough to be heard readily by those about him. It seems now that the retention of the tube was a mistake, for extension of the malignancy has taken place to the tracheotomy wound, due very likely to the irritation caused by the presence of this foreign body. On Jan. 20, 1927, a seed was implanted in either arytenoid, and at

present all signs of the growth have disappeared. The patient's general condition is excellent; he has gained many pounds in weight, eats and sleeps well, and has been able to return to his occupation. At the time the implantations were undertaken he was on the point of suicide; now he is happy and optimistic. There have never been any reactions after the radium implantations, nor any distressing symptoms, so we feel that even should it prove that only palliation has been effected, we should regard our efforts as well rewarded.

Case 2: M. E., glazier, age 67 years, venereal disease denied; formerly used alcohol to excess, but not of late years; drinks nine or ten cups of coffee per day; has coughed for years; teeth missing, except for a few infected roots. Has been able to swallow only liquids for the past six months, often these are regurgitated. Has lost ten or twelve pounds in the past few weeks, is senile and in general a very poor surgical risk. An X-ray taken Aug. 18, 1926, showed a filling defect and structure typical of carcinoma of the esophagus. Esophagoscopy revealed a cauliflower growth completely occluding the esophagus. The pathological report on the specimen taken for biopsy was squamous cell carcinoma.

On Aug. 14-15, X-ray exposures were given and on Sept. 16 an implantation of platinum radon seeds was done, using five seeds placed at a distance of 2 c.m. apart, the total dosage being about 1,660 m.c. hours. When the patient returned two weeks later for removal of the seeds the mass had regressed so much that a clear view into the gastric cavity was possible. We learned that one week after the radium was applied—in direct disobedience to orders—the patient had been able to take cereal and bread and milk without regurgitation. At present he is in excellent condition and able to eat far more than we wish him to have.

Case 3: C. S. R., physician, age 67 years. History of dysphagia for one year; all teeth had been removed without any favorable effect upon the swelling of the neck. Section from a cervical gland proved malignant. Radium needles had been applied, with immediate improvement, but four weeks before being seen by us there had been a recurrence of pain and swelling on the right side of the neck—a renewal of the old process around the epiglottis with extension into the cervical glands. Examination showed both pyriform sinuses filled with the mass, the arytenoids indurated, and the epiglottis highly edematous. The patient was very toxic in appearance.

On Sept. 11, 1926, ten 3-m.c. platinum radon seeds were implanted, four being placed externally and six within the larynx. There was no reaction, and immediate local and general improvement followed, the swelling and edema disappearing entirely. When seen a short

time ago this patient was in excellent condition, but we have since heard that there appears to be a recurrence in the right pyriform sinus, and we are endeavoring—thus far without success—to have him return for inspection.

Case 4: W. J. McL., age 65 years. Gonorrhea in youth, history otherwise negative. Complaint of difficult and painful swallowing dating from the beginning of May, 1926. No teeth remained but gingivitis was present; the tonsils and cervical glands were enlarged. Specimen removed from larynx by snare was reported advanced squamous-cell carcinoma. On Sept. 9, 1926, by laryngoscopy suspension platinum radon seeds to the value of 2,000 m.c. hours were implanted. These were withdrawn on Sept. 23, and a second implantation of 1,333 m.c. hours made. At this time the larynx was clear and the swelling of the neck greatly diminished. Two more seeds were used on Nov. 4, and again on Dec. 16 seeds to the value of 1,333 m.c. hours were applied. A final implantation was made on Jan. 20, 1927, three seeds being placed in the right arytenoid, one in the left arytenoid, one in the false vocal cord, and one in the posterior pharyngeal wall. When seen a few days ago this man was in excellent general condition; the edema had completely subsided and the voice returned almost to normal.

This patient received a total of approximately 7,000 m.c. hours, the repeated dosage seeming more adapted to this case.

Case 5: P. S., peddler, age 56 years; mother died of cancer, history otherwise negative. There had been difficulty in swallowing for six months, with regurgitation at times. The man had lost more than twenty pounds in weight, his appetite was poor, and his general condition bad. All the teeth were missing. Gastrostomy was done on Oct. 11, 1926. The esophagoscope had been introduced three days before, great difficulty being experienced in passing it on account of severe hemorrhage. A mass was found completely occluding the esophagus and the specimen removed was reported squamous-cell carcinoma. On Oct. 21 three seeds were implanted through the esophagus, and a second implantation of seven seeds was made Nov. 11, 1926. Six days after the first implantation this man was able to drink water freely and to swallow gruel. The gastrostomy wound was closed and when he has since reported from time to time, he was found to be in excellent general condition.

Case 6: R. S., no occupation, age 65 years; antecedents irrelevant. Difficulty in breathing and swallowing for the past year. No teeth, but a few badly diseased roots remaining in the mouth; has, however, eaten large quantities of meat. Examination showed exten-

sive extrinsic and intrinsic involvement of the larynx, both cords being ulcerated; there was also edema of the false cords and arytenoids. The X-ray showed moderate density in the superior mediastinum, and biopsy revealed squamous-cell carcinoma. Five seeds were implanted Oct. 14, 1926, and coincidentally the mouth was cleaned up, all the old roots extracted, and advice given as to diet. When this man came for treatment his family could not understand what he said, but within two weeks of the implantation he was able to articulate distinctly, has gained steadily in weight, and when seen a few days ago, was in excellent condition, though the false cords are still slightly congested, and the left arytenoid somewhat edematous.

Case 7: C. L., carpet layer, age 56 years, gonorrhea when young, no other important history. No molar teeth, but has continued to eat all kinds of solid food. About seventeen weeks previously he had expectorated blood, and a physician whom he consulted advised radium, which was applied externally without benefit. When seen by us a growth projected about 1 c.m. from the posterior wall of the pharynx, extending above the soft palate on the right, diagonally across to the epiglottis on the left. The pathologist reported squamous-cell carcinoma. On Nov. 4, 1926, nine platinum radon seeds having a total of about 3,000 m.c. hours were implanted, and on Dec. 9 a second implantation of three seeds was made. This patient has gained steadily in weight, all signs of the growth have disappeared, he is able to eat everything, and feels in general good health. He probably received more radiation than his lesion really needed, but there was never any reaction, and the improvement has been continuous since the treatment was instituted.

Case 8: J. J. B., general utility man, age 59 years; uses neither tobacco nor alcohol; previous history negative; no teeth. Six weeks ago he experienced some difficulty in swallowing and pain in the throat, and on consulting a physician was told that he had a "growth" in the larynx and should enter the hospital. On examination a very large infiltrated edematous epiglottis was seen; the right pyriform sinus was completely filled, the right arytenoid edematous, and the cords invisible because of edema. Nov. 4, 1926, under suspension laryngoscopy, seven platinum radon seeds were implanted, four in the arytenoids and three in the epiglottis, a total dosage of about 2,300 m.c. hours. A second implantation was done Dec. 16, when four seeds with a total value of 1,333 m.c. hours were used. At present the mass in the sinus has practically disappeared and the edema of the arytenoids and epiglottis is greatly reduced. Though there is still some evidence of edema of the left side of the epiglottis

and left arytenoid, the man is gaining in weight steadily, and declares that he feels well.

Case 9: J. S., woman, age 54 years, dressmaker, history of miscarriages; Wassermann test positive. This woman had been growing hoarse for more than a year; had received treatment for "laryngitis," but the condition had steadily grown worse. On May 22, 1926, a tracheotomy was done, and sufficient relief in breathing afforded to permit the patient returning home, though against the advice of those in attendance upon her. She was readmitted on Oct. 10, with no change in her weight, or any great alteration in the appearance of the growth in the larynx. A specimen secured Oct. 22 was pronounced epidermoid carcinoma. Five platinum radon seeds, total value about 1,666 m.c. hours, were implanted, with immediate local and general improvement. The patient has not been seen recently, but was doing well at last accounts.

In considering this series of cases one or two strong points of resemblance may be noted in all of them. The lesion proved in every instance to be squamous-cell carcinoma, and each patient was either wholly edentulous, or had lost all the molar teeth. When these patients have been fitted with artificial teeth they usually wear them only "for show," never using them for mastication, but they nevertheless continue to eat solid food of all kinds, and there is no doubt in my mind that such dental conditions strongly dispose toward the production of laryngeal and esophageal cancer.

When we consider that a malignant lesion may give every appearance of cure, remaining quiescent for years, only to flare up suddenly and fatally at the last, and that even the five-year period designated as the shortest time in which we can judge whether cure has actually been accomplished, is purely arbitrary, it is obvious that we are not in a position to make any claims that the therapy just discussed is capable of abolishing cases of carcinoma of the larynx or esophagus which are regarded as outside the province of surgery. The patients whose cases are here reported have most of them shown decided improvement. Men who only a few weeks ago were despairing wrecks of humanity, praying for death to come to their relief, have been able to resume work and return in large measure to their regular routine of life. Even those who are encumbered with a tracheotomy tube are far more comfortable and at ease in both body and spirit than are those with lesions far less advanced, who have not had the benefits accruing from radium applications.

Even if radium accomplishes nothing more than temporary palliation, it has undoubtedly demonstrated its value, and I feel certain that it is only because such lesions as those of the larynx and esoph-

agus are so inaccessible, and the tissues of which they are composed so quickly rendered radiosensitive, that the use of this element has heretofore found so few advocates in the treatment of cancer of these areas. The employment of suspension laryngoscopy makes the placing of the radium in the larynx a comparatively simple matter, and with the esophagoscope and the use of the fluoroscopic screen, it can be put into the esophagus with equal facility. The opponents of radium in the treatment of such malignancies have continued to cite the severe reactions and distressing sequelae which followed the earliest use of the crude radium applicators first employed for work in these peculiarly sensitive structures. No division of therapeutic endeavor has seen any such advance within so short a period as has the means of applying radium to malignant lesions, especially those until a short time ago regarded as wholly inaccessible. When the implantation technique was first used in the larynx, bare tubes were employed, and the necrosis produced by these unscreened containers caused sloughing of the irradiated tissues and, frequently, grave injury to adjacent healthy cartilage. In the esophagus the caustic rays were even more dangerous, for here sloughing was almost sure to cause perforation into the lung, with results practically certain to be fatal. It is hardly strange that after a few such accidents, even enthusiasts ceased to use radium under such adverse conditions.

The design of the "seeds" used in our cases, however, obviated practically all the difficulties encountered under the older methods. Implantation is by far the most accurate way of assuring even and adequate radiation throughout the neoplasm, and as soon as it became possible to implant a *screened* container, doing away with all danger of necrosis, laryngology and esophagoscopy made it relatively easy to place the radioactive centers so that every section of the growth was reached by the therapeutic rays, while all caustic action was eliminated. The removable feature of the seeds, which does away with the difficulties attendant upon permitting foreign bodies to remain in tissues so situated, is also an important advantage offered by this particular technique.

While it is still too early to draw any conclusions as to the final *curative* value of this method of applying radium emanation, I am convinced that regarded purely as a palliative it is far in advance of anything else heretofore put forward for this purpose, and taking into consideration also the fact that all forms of radium therapy are still in large measure on trial, it seems to offer more hope of permanent benefit to a peculiarly hopeless group of cases than anything which has so far been made available to us.

270 Madison Avenue.

RELATIONSHIP OF ENDOCRINES TO OTOLARYNGOLOGY.*

DR. EDGAR E. POOS, Detroit.

The otolaryngologist often has patients who have been treated by other men in other branches of the profession without any success. We treat them and get no better results, whether it be by conservative or radical treatment, both the patient and doctor becoming disgusted, due to the poor results obtained in the case.

These cases I often find have an endocrine basis which, if treated at the same time in conjunction with the usual treatment of the particular pathology present, often give surprising results.

Just as infections of the nose and throat affect other parts of the body, so may infections and other disturbances in the body affect the nose and throat.

I will now consider some of the conditions with which I have had the best results. Everyone is familiar with the results of tonsillectomies in children; in some cases the results are wonderful, in others, failures. Why do some children have large tonsils and others small ones?

Many children start out in life with the condition known as exudative diathesis or status lymphaticus, have a history of difficulty in digesting milk, fats, carbohydrates and eggs, often having eczema, urticaria, anaphylactic to serums and various proteins, asthma quite often, big heads, pot bellies, fat pads.

They are slow in mental development, have dripping, watery noses, signs of spasmophilia, sway-backed, flat-footed, winged scapula, thin, velvety or dry skin, deformities of ears, nose thickened, high-arched palate, harsh voice, mouth breathing, snoring, adenoids, lymphatic enlargement of structures constituting Waldeyer's ring, hypertrophy of lingual tonsil.

Lymphoid masses behind posterior faucial pillars following removal of tonsils and frequently filling in of tonsillar spaces with lymphoid masses free from crypts, as mentioned by Bordley, of Baltimore, as well as the persistent and protracted vasomotor and vasotrophic changes seen in the pharynx and nose, particularly in the anaphylactic type, as mentioned above, suggest Nature's effort to

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give to the economy a needed substance which surgery has removed, and the fact that minute doses of thyroid with lymphatic substance and sometimes some of the other glands overcome many of these symptoms lends support to the view. One of the other symptoms of hypothyroid conditions is tinnitus aurium. Due to a cellular infiltration of Eustachian tube and structures in the ear. R. A. Barlow examined 5,000 cretins in Switzerland; 29 per cent were deaf mutes, 29 per cent of remainder, hard of hearing, probably due to a disturbance in response to stimuli of the eighth nerve tracts, possibly due to edema or associated anemia of the nerve. You will also find in these cases a cellular infiltration of turbinates, pharynx and larynx. These cases are often connected with thymus conditions, as shown by L. Hubert, in which you get the added signs of dyspnea, attacks of suffocation and choking, and take anesthetics very badly.

It is now generally accepted that the thymus is related to growth and development, reaching its greatest size at puberty, then undergoes a process of involution, but doesn't entirely disappear during life.

Diagnosis; history, general appearance, examination and X-ray. They are divided into two groups.

1. Those in which enlarged thymus is most prominent feature, and dyspnea most common symptom.

2. Cases which present signs that have been associated with status lymphaticus with little or no enlargement of thymus, in which nasal obstruction and general weakness are the most common symptoms.

Another condition with which I have obtained good results is hyperesthetic rhinitis.

Frank J. Novak, Jr., and Abraham Hollender found that the ionic calcium content varied in hyperesthetic rhinitis from 6.76 to 9.8 m.g. per 100 c.c.m. of blood. It is invariably low in hyperesthetic rhinitis but not always in asthma and hay fever. This is probably due to a chronic focal infection, most commonly a sinusitis, in other cases tonsils, teeth or of intestinal origin.

I find that many of these cases in women have menstrual disturbances, and in both sexes a neurotic element. Calcium with thyroid and parathyroid gives the best results; usually a change in diet is most beneficial.

Everyone is familiar with the effect adrenalin has in stopping hemorrhages, relieving congestion of turbinates, etc., and its use in operations. Pituitrin in 10 to 15 minim doses given intramuscularly fifteen minutes before an operation will cause coagulation time to be reduced one-third to one-half and hemorrhages greatly reduced.

Another antihemorrhagic remedy is prepared from brain tissue and has been named thromboplastin and is used locally, being swabbed on the cut surface.

Some of the other conditions relieved by endocrine therapy are vagotonia and sympatheticotonia.

Symptoms of vagotonia are due to irritation of parasympathetic nerves, *viz.*, oculomotor (midbrain), chordatympani, Jacobson's from superior cervical ganglion, also branches to the bronchi, manifested by contracted pupil, widening of eye slits, increased lacrimation, increased secretion of nasal, oral and pharyngeal mucous glands, conditions commonly known as catarrh, increased salivary secretion, contraction of laryngeal muscles, such as is met in laryngospasm, increased bronchial secretion, such as in bronchitis, spasm of esophagus, in esophagospasm and of bronchial musculature in asthma.

Symptoms of sympatheticotonia: Dilated pupil, protrusion, lessened lacrimal secretion, lessened mucous secretion, in nose, throat and bronchi, vasoconstriction.

I have also found many of the paresthesias, anesthetics, aphonias and nose disturbances of vasomotor or vasotropic origin to be of endocrine origin, which clear up under proper treatment.

The question most likely asked is how are various endocrines affected in so many cases? Some of the causes are heredity, environment, cares, worries, infections in childhood and later focal infections, mode of living and, lastly but not least, the modern diet.

McCarrison has shown by various experiments in feeding that the thyroid to the body is like a draught to a fire. It tends to atrophy in all classes of food deficiencies except Vitamin C and it is rendered more susceptible to injury by bacterial and toxic agencies, which may cause extensive degenerative changes in its cells, also congestion.

The parathyroids control calcium metabolism and efficient calcification of bone and teeth.

A deficiency causes an increased irritability of nervous system.

Hemorrhages into parathyroids are apt to occur when deficient food is excessively rich in fats and starches. These observations have an important bearing on occurrences of tetany and various spasms in improperly fed babies.

Adrenal medulla, whose hormone is believed to be concerned in maintenance of vascular tone and excitation of sympathetic nerve terminals throughout the body, and the adrenal cortex to metabolism of lipoids and sex organ growth, enlarges in consequence of all classes

of deficient food employed in the experiments. It tends to be less marked when food is more perfectly balanced with respect to proximate principles and tends to be marked when food is disproportionately rich in energy bearing constituents. Pituitary body is concerned in skeletal growth, physical and mental growth, also of sex-organs and psychic function.

The pituitary has a tendency to enlargement when all other endocrine structures atrophy except adrenals. Spleen atrophies on diet of autoclaved rice. It has a hematopoietic and hemolytic function. Thymus atrophies in absence Vitamin B.

Many of the headaches which do not clear up after nose and eye treatment are often of pituitary origin, one of the typical headaches of posterior pituitary hyperplasia origin is the occipital headache radiating behind the ears, down the neck, spine and sciatic region.

Conclusions: There are many conditions which the otolaryngologist sees that are of endocrine origin.

Many of these cases improve rapidly when proper endocrines are given in conjunction with regular treatment. Every case has to be individualized and treated accordingly, investigating their habits, general health, environment and especially diet. As our knowledge of the actions of various endocrines increases many of the problems of the otolaryngologist will become less.

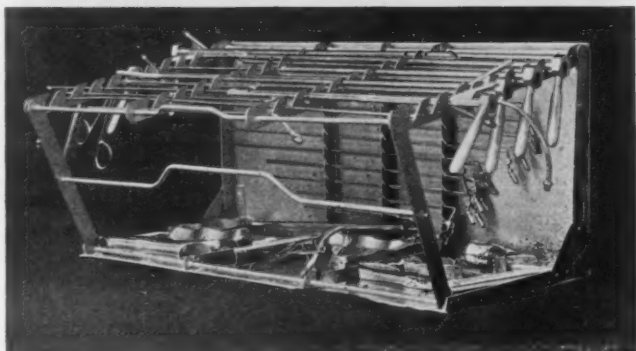
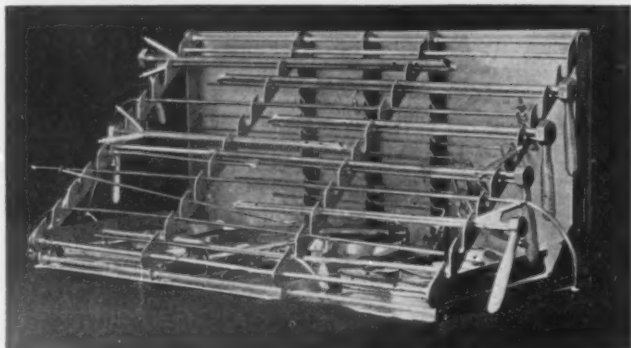
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- 13,300 Woodward Avenue.

RACK FOR TUBULAR ENDOSCOPIC INSTRUMENTS.

DR. M. C. COMER, Tucson, Ariz.

Realizing the need for a suitable rack for tubular endoscopic instruments that would facilitate selection and thereby avoid unnecessary handling of instruments not needed, we had this equipment made.



It fits nicely in instrument cabinet and if necessary can be taken to operating room. In order to reach light carriers in back of tray the rack can be raised as in Fig. 2.

The measurements are 18x9x9. This tray could no doubt be improved, but we like it as it is.

27 S. Scott Street.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication July 18, 1927.

THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

COLLEGE OF PHYSICIANS.

Meeting of March 1, 1927.

(Continued from page 628.)

Case 2: Patient age 58 years, male, who five months prior to admission to the hospital had had a radical mastoid operation performed. When admitted to the hospital there was a temperature of 103°, intermittent speech, indifference, and finally stupor. Physical examination revealed full pulse, foul discharge from the middle ear, Jacksonian convulsions on the right side, which was followed by a right-sided hemiplegia, paralysis and a left-sided facial palsy. Operative findings: 1. Lateral sinus close to the posterior canal wall. 2. Temporal sphenoidal abscesses evacuated, of which the pus was very offensive. At first it was thought that these symptoms were caused by a vascular disturbance, due to the age and full pulse. However, operation revealed a temporal sphenoidal abscess, which was responsible for the above symptoms. The paralysis disappeared and the mentality improved after the abscess was evacuated. On the sixth day the patient developed pulmonary edema and succumbed to it.

Cases of pachy meningitis (2): In both instances there was no history of suppurative otitis media. The most important symptoms were unilateral impaired hearing of the mixed variety, and temporal headaches, which could not be controlled by opiate. X-ray studies revealed the large cellular type of mastoid, with cloudiness and breaking down of the cells. In one case there was a shadow about the size of a 25-cent piece above the zygomatic area. In both cases there was no increase in the intracranial pressure, no papillitis, and no involvement of any of the cranial nerves.

Operative findings: Coalescent type of mastoid of the large cellular type. An epidural abscess was found in both cases. Both patients made uneventful recoveries.

Conclusions: In all ear cases associated with impairment of hearing, especially with pain in the head, Roentgenologic studies should be made, as the X-ray study was the only thing that really helped us in making our diagnosis.

Cases of sinus thrombosis (4): These cases were more or less typical as the temperatures were septic and were accompanied by rigors and chills. In two instances there was a positive blood culture. The blood picture was that of secondary anemia, chlorotic in nature. The total leucocytes and the differential counts were not at any time consistent, although occasionally there was an increase in the polymorphonuclear leucocytes. Our experience in sinus thrombosis with jugular ligation is to transfuse the patient, taking special care in our agglutinations and cross-agglutinations. It was noted that after the blood transfusion there was a drop in the temperature and after every consecutive blood transfusion there was a decided improvement, although we had tried metaphen in two streptococcus hemolyticus sinus thrombosis infections. The patients recovered, but we did not notice the marked change that always follows a blood transfusion.

Conclusion: In one case the patient had a bronchopneumonia secondary to the lateral sinus blood infection. It was suggested that we ligate the jugular, as the patient at this time developed an embolic foci in the right shoulder. While ligating the internal jugular under local anesthesia, the patient developed a facial palsy, which was probably secondary to the infiltration of the novocain. This condition, however, cleared up two hours after the patient returned to bed. In our experience we found that blood transfusions are the most potent therapeutic measure to overcome infections.

Temporosphenoidal Lobe Abscess. Dr. M. Valentine Miller.

Case Report: James R., age 39 years, waiter, married. Admitted July 8, 1925. Died July 31, 1925. Diagnosis: Temporosphenoidal abscess with basal meningitis following mastoiditis.

C. C.: Pain in the right ear.

H. P. I.: Six weeks ago sneezed violently and heard something "snap" in his right ear. Has had constant pain since. Several days after onset of pain he began to have discharge of pus from the ear. This stopped two weeks before admission to the hospital and the pain has been increasing. Had seen no physician before coming to the hospital. Has had constant headache.

Examination: On admission, temperature 96.8°, pulse 78, respiration 20. Examination of the right ear showed redness and bulging of the drum, with some sagging of the posterior superior canal wall. There was general tenderness over the right mastoid process, but very little swelling. Physical examination was otherwise negative.

Course: The day following admission the temperature rose to normal but not beyond. A simple mastoidectomy was performed that afternoon. The mastoid cells were found filled with granulation tissue. Pus was found in the antrum and some nearby cells, together with granulation tissue. There was a small perisinus abscess which was drained by removal of a portion of the sinus plate. The sinus was normal in appearance. The wound was closed by the blood clot method.

For two weeks following the mastoidectomy the patient seemed to be doing very well. He was up and about the ward. There was no pain and the drainage from the wound was slight. The temperature, however, was somewhat irregular. For four days after the operation the temperature was normal. On the fifth day it rose to 100.4°. The following morning it was normal. For the next three days it hovered between normal and 99.6°. For the following four days the morning temperature fell to about 97°, rising to normal in the afternoons. The pulse made occasional falls, at times as low as 62. This was the first suspicious sign of brain abscess.

On July 23, two weeks after the mastoidectomy, the patient began to complain of frontal headache and the temperature rose to 101°. That day it was noted that the right pupil was slightly larger than the left. This was probably the first organic sign of temporal lobe pressure. Nothing else out of the ordinary was seen at this time.

For the next three days the patient's general condition seemed good and the pain was not severe, though it was constant. The temperature did not rise over 100.4°. Drainage from the wound was decreasing.

Three days after the onset of the headache the pain began to be more severe and morphin began to be required. This quieted him, but did not give much relief from the pain.

Four days after the onset of headache the temperature rose to 102.8° and the pulse to 90, but the next day the temperature was 99° and the pulse 62. The right pupil was dilated and reacted sluggishly to light—too persistent signs of brain abscess.

Dr. Yaskin saw the patient on the fifth day of the headache and made the following notes: No diplopia, no vomiting, no vertigo. Patient appears bright and co-operative. No photophobia at this time. Some limitation of muscles of neck. Slight Kernig, more pronounced on left. Brudzinski absent. Cranial nerves: 3-4-6: Palpebral fissure on right more narrow than on left; pupils dilated by a midriatic and are equal—otherwise negative (homatropin had been instilled into eyes before examination); 5: Sensory and motor O. K.; 7: Doubtful weakness of left lower facial; 8: Not examined; 9: Tongue about midline; palate deviates somewhat to left. Musculature in general is weak, possibly more on left, especially the leg. Abdominal and cremasteric reflexes increased, but considerably more on the left. No clonus, but definite Babinski on both tests unsatisfactory. No asteriognosis. Rhomberg's position: patient sways inside. One-half-inch hypermetria of left hand in F. to N. test. Past-pointing definitely, probably due to general weakness. Sense of position O. K.

Summary: Evidence of meningeal irritation fairly definitely involving the left pyramidal tract, with probable indirect pressure upon the right pyramidal tract.

Impression: Localized meningitis, or early brain abscess on the right side.

As the treatment for meningitis and brain abscess would differ, no surgery could be undertaken on the double diagnosis. The most positive of the findings were the mild ones, e.g., facial weakness on the opposite side (left), and

muscular weakness on the opposite side, both of which pointed definitely to brain abscess.

An eye examination was made by Dr. Mershon the same day Dr. Yaskin made his examination. Dr. Mershon's report showed the media all clear, vessels of normal size, and the eye grounds negative.

On July 29, twenty days after the mastoidectomy, though the temperature was practically normal, the patient was slightly irrational. The rigidity of the neck muscles was more marked. The pulse was slow, being 64. By evening the symptoms were more pronounced; Kernig more pronounced; neck more rigid; considerable increase in the amount of the discharge from the wound; the left pupil was wider than the right, though both were wide open.

The following morning his condition seemed to be somewhat improved. The temperature was normal and the pulse was 80 to 88, and he complained less of headache. About the middle of the morning there was a sudden change for the worse and the patient began to vomit. The temperature began to rise, though the pulse remained normal. The left side became flaccid, showing a progressive lesion in the right temporosphenoidal lobe, post-cortical in location, and the right arm showed convulsive movements.

The patient was taken to the operating room about 3 p. m. in a comatose condition and the wound opened.

Operating notes: 1. Small sinus at lower end of old wound discharging pus in small amounts. 2. Incision made through old wound. 3. Clot and granulations evacuated, and lateral sinus exposed and found to be normal. 4. About one-half inch of bony tissue removed and the middle fossa opened. 5. Small drops of pus exuding from zygomatic area with a sinus extending downward and forward. 6. Dura not under pressure and no pulsation noted. 7. Stab made with brain knife resulted in discharge of greenish pus. 8. Hemostat inserted and free flow of chocolate-colored pus resulted. 9. Dura exposed for space of $\frac{3}{4}$ by $1\frac{1}{4}$ inches. 10. Incision through dura about $\frac{3}{4}$ inch long. 11. Rubber drainage tube inserted into abscess cavity, which extended downward and forward. Cavity about 2 inches deep. 12. Tube brought out behind ear and iodoform gauze packed around it. 13. One silkworm gut suture inserted in upper part of wound and one below. 14. Dry dressing applied.

About one-half hour after return from operating room the patient's left arm began to move.

At 8:30 p. m., the patient was in a semicomatose state, but conscious. Could hear and understand when spoken to. Could move arms and legs. Appeared to be suffering considerably. Pulse good.

At 11:30 p. m., the ward notes show that he was moving both arms and legs and that ocular movements were normal. Respiration was irregular. The pulse was good.

About 3:10 a. m. on the following day, the patient's condition began to get worse and he died at 3:50 a. m.

Autopsy report: Abscess cavity found in the temporosphenoidal lobe of the right side, about the size of a hen's egg. Cavity had a definite wall. There was a small perforation from the mastoid cells into the middle fossa at the junction of the superior petrosal and lateral sinuses. In this region there was considerable necrosis of bone. The pus had worked beneath the tentorium into the posterior fossa through a necrotic bit of bone. Considerable pus was found about the cerebellum and brain stem.

Laboratory reports: Urinalyses on July 9, 10 and 23, negative. July 23, W. B. C., 7,950. July 27, W. B. C., 13,700; S. L., 15 per cent; T., 5 per cent; P., 80 per cent. July 29, W. B. C., 8,900; S. L., 17 per cent; L. L., 6 per cent; T., 1 per cent; B., 1 per cent; P., 75 per cent; R. B. C., 4,270,000; Hb., 90 per cent.

Blood culture on July 28 showed no growth.

Pus from brain abscess on July 30 showed: streptococcus viridans, staphylococcus albus.

DISCUSSION.

DR. J. C. YASKIN: The subject has been so completely presented by Dr. Shuster, so well illustrated by Dr. Ersner, and so well discussed by Dr. Coates that there is very little for me to add. Considering the high frequency of

intracranial complications of otologic origin, the subject is of great neurologic importance. The surgeon justly demands early recognition and localization of operable conditions, and depends upon the neurologist for light in such cases. Now, the neurologic evaluation of these conditions, especially in the early stages, is most of the time extremely difficult. The symptoms are frequently vague and readily attributable to almost any constitutional condition, and the objective signs are frequently absent or so vague as to be of no localizing value. We must always be on the lookout in ear cases, however, for some neurologic disease not directly attributable to the ear condition. Thus, a child having a discharging ear was admitted to Dr. Ersner's service with a diagnosis of brain abscess and proved to be a case of epidemic encephelitis. I have seen a similar case in another hospital.

There are certain complications which occur commonly in ear disease. These are:

1. Lateral sinus thrombosis, which is more of a general blood stream infection than a brain affair, unless it invades the surrounding brain tissue, forming a cerebellar or tentorial abscess. The value of the Ayer-Tobey test in such cases has been pointed out by Dr. Shuster. Cavernous sinus thrombosis is easily recognized and fortunately rare.

2. Meningeal involvement: The question of meningeal involvement is extremely important. With the appearance of headache, phobia, limitation of motion in neck, etc., the surgeon gets uneasy and calls for neurologic help. To arrive at any conclusion as to the extent and location of the lesion, the neurologist should and always does get a clear chronological history of the development of symptoms, all the laboratory and clinical data, the exact operative exposure and findings, and this, together with the objective neurological findings, leads to the evaluation of the possible condition. Meningeal involvement may manifest itself in various ways, such as a localized meningitis, a diffuse meningitis, and what has been called by some a meningitis symptothica, or protective meningitis.

A localized meningitis may exist without any previous history of a discharging ear or even earache. One such case was shown this evening by Dr. Ersner. This patient came to us complaining of sharp shooting pain over the left parietotemporal region, which was much worse at night. The diagnosis of localized pachymeningitis was made. This was confirmed by X-ray findings of extensive mastoid disease, and proved by operative exposure. A similar case of ours with no discharging ear, but a previous otitis, was operated on seven years ago by Drs. Coates and Ersner. In these two cases, the only symptom was pain in the head, without any constitutional reaction, and without other localizing signs. In contradistinction to these cases which showed no other localizing signs, there are other cases of meningitis which may present only a few localizing symptoms. One such case, a few days after a bilateral mastoid operation by Dr. Dintenfuss, developed a pain in the left eye and face, and a left abducens paralysis. This so-called Gradenigo's syndrome cleared up in about one week and the patient made an uneventful recovery. It was undoubtedly due to a localized meningitis in the neighborhood of the center and of the pyramid.

The types of meningeal involvement just described are relatively easy to diagnose and act upon. But when we find a patient with evidence of suppuration, including a history of chills, fever, headache, vomiting, general malaise, some rigidity of neck, photophobia and suggestion of Kernig, it is often extremely difficult to decide as to whether we are dealing with a meningitis or brain abscess, or both. What are the important criteria which enable us to distinguish between a meningitis and abscess? These are the outstanding possibilities.

1. The meningitis may be local or diffuse. There is a type of meningitis, the meningitis symptothica, described by Plant, Rehn and Schottmuller, characterized by rather typical findings in the cerebrospinal fluid. These are: a. An increase in the amount of fluid; b. Turbidity of fluid; c. Pleocytosis, with relative predominance of polymorphonuclear cells; and d. An increase in albumin contents. This picture does not represent an actual bacterial meningitis, but rather a reaction to a localized process and bears watching. The

danger of a lumbar puncture for diagnostic purposes is overestimated, at least in so far as early cases are concerned. There is no harm in withdrawing 2 or 3 c.c. of C.S. fluid by the drop method for diagnostic purposes in doubtful cases. A clear fluid with low cell content usually indicates a meningismus, and affords a hopeful prognosis. The presence of bacterial growths helps to establish an early bacteria meningitis and helps in a therapeutic way.

2. In the search as to whether the patient has meningitis or abscess, the question arises whether there is evidence of increased intracranial pressure. Here we must insist on frequently repeated examinations of the eye grounds, which are of unquestionable value. The absence of papilledema does not rule out a localized collection, but at least speaks against serious compression. The existence of a slow pulse, recurrent, though transient, elevation in systolic blood pressure, are of great diagnostic importance, in determining the existence of a brain abscess. Again, one must remember that evidences of increased intracranial pressure may also be due to a meningitis causing a ventricular block.

The mental alertness and irritability described by Dr. Shuster are of value in making differential diagnoses, but not nearly as much as one finds it at the bedside. By far more important is the widespread involvement of the cranial nerves, which is rarely present in abscesses. We must always remember that the protective sterile meningitis may be associated with a brain abscess and be on the job to detect the latter.

In the final analysis the information that you, gentlemen, desire is whether your patient has a localized collection of pus, and if so, where is it? Now, with evidences of the existence of suppuration, such as cerebral suppuration, chilliness, headache, vomiting, etc., one must carefully search for evidences of cerebral compression, which may be evidenced by swelling of the optic discs, slowness of the pulse and often mental stupor. Then an attempt at localization must be made. Let us bear in mind that any process that involves a great many structures, especially the cranial nerve nuclei, is probably diffused meningitis. Yet it often happens that a localized collection may give rise to neighboring symptoms or even symptoms and signs at a distance. The most common sight of abscesses are, as you well know, in the temporosphenoidal and cerebellar regions.

Abscesses in the temporal area are very common in middle ear diseases, usually by direct extension from the focus of infection. While involvement of the temporal lobe usually causes definite symptoms, it is not always easy to localize a lesion in this area. This is especially true of the right temporal lobe. Here, as elsewhere of course, the general evidences of brain abscess' such as we mentioned before would be of value. These are intense headache, mental dullness with crying spells, slow pulse, vomiting, elevation of systolic blood pressure, variable leucocytosis and, sooner or later, varying degrees of papilledema. In the left temporal lobe, the occurrence of an auditory aphasia is of great benefit in localization, and if the abscess lies deep enough there occurs a hemianopsia, due to the involvement of the optic radiations as they pass out of the superior colliculi on their way to the occipital lobe. Localization in the right temporal lobe is not easy, for this is one of the most silent areas of the brain. Hemianopsia here is of great value.

Knapp considers a slight contralateral paresis and convulsions as signs of a temporal lobe involvement. In this connection a case presented by Dr. Ersner is of value. This patient had a temporal abscess which manifested itself several days after I first saw him, by convulsions and contralateral hemiparesis. It illustrates, in addition, the fact that in these cases of suspected brain abscess, repeated neurological examination is necessary, because symptoms are fleeting and transitory, and often late in appearing. Thus, in this case when I first saw him there were no localizing signs. Examination on the following days showed signs which made it possible to localize a cerebral abscess. Another of our cases, presented by Dr. Ersner, illustrates the fact that slight localizing signs are of great value in establishing a diagnosis. This patient had clinically signs of a localized basilar meningitis and, in addition, papilledema and the headache and pulse of cerebral compression. Operation revealed a small collection of clear fluid over the temporal area. The patient recovered completely.

At times, however, an absence of increased intracranial pressure is found in brain abscess. In this connection another case is of interest. This was a young girl who for some time showed no signs of increased pressure, and in whom a diagnosis of meningitis was made. She later developed an abscess of the zygoma, which was opened and a large temporal lobe abscess was found.

In the matter of cerebellar abscesses the most important signs are dependent upon the presence of asynergia, i.e., failure of the finger and nose test, knee and heel test, past-pointing, etc. This, combined with evidence of paralysis and other neighboring signs, may help in making a diagnosis of cerebellar collection. It is well to remember in this connection that lesions in the cerebellum give much more intense headache and much more pronounced early choking of discs. The diagnosis of frontal abscess may be much more difficult, as it is very much slower in oncoming. Failure of memory and attention with character deterioration and later pressure symptoms upon the cordical motor area, together with increased intracranial pressure, should be the determining factors in suspecting a frontal lobe tumor when there is a history of ear or sinus infection.

Meeting of April 5, 1927.

Otitic Brain Abscess. Dr. Emily Lois Van Loon (by invitation).

The patient is a Danish woman, age 23 years, who came to the clinic, June 29, 1925, complaining of headache, discharging ear and soreness over the right temple. She gave a history of a discharge from the right ear for the preceding year. Two weeks before coming to the hospital, she developed frontal headache and tenderness in the right temporal region. As these symptoms were becoming progressively more severe, she was admitted to the hospital. Her temperature on admission was 100°.

Examination showed a thin, serous discharge coming from the right ear. There was no tenderness over the mastoid, but marked tenderness just above the ear and over the zygoma. X-ray report was "Sinus negative; obscuration of the right mastoid, indicating chronic mastoiditis." The eye grounds were reported normal.

The day after admission, the mastoid was opened, and 15 c.c. of pus found coming through the tegmen tympani. The abscess thus found was drained through the mastoid wound. To insure better drainage, a second operation was done two days after the mastoid was opened. Under gas-oxygen anesthesia, a piece of bone the size of a quarter was removed from the squama over the abscess, a crucial incision made in the dura, and the meninges protected with iodoform gauze. A piece of rubber tissue was introduced into the abscess for drainage. Post-operative treatment included frequent irrigation with Dakin's solution. After the operation, the patient's tongue and the left side of the face twitched constantly, but within a week these symptoms disappeared, and the temperature reached normal.

Blood count on admission showed 15,000 W. B. C. There were 40,000 two days later, and 15,000 again two days after that. Culture of the pus obtained at operation showed streptococci and staphylococci.

The patient made an uneventful recovery, and was discharged from the hospital in good condition ten weeks after her admission.

A Case of Sarcoma of the Nose. Dr. Ralph Butler and Dr. Emily Lois VanLoon (by invitation).

This patient is a white male, age 22 years, whose symptoms began six years ago with nasal obstruction, difficulty in swallowing, impaired hearing in the right ear, and a tumor mass which he could feel projecting from the right nostril. There was no pain, no discharge and no bleeding. The tumor was removed surgically, but recurred. Six months after this operation, he came to the Lankenau Hospital, where a section removed for diagnosis proved to be fibrosarcoma. The patient at this time was underweight and in poor physical condition. Examination showed a red, hemorrhagic mass filling the right nasal cavity and pushing the septum over against the left turbinates.

In March, 1922, 50 m.g. of radium were used in the nose for twelve hours, and the same dosage repeated three weeks later. Radium was used six times during the first year of treatment, and in smaller doses subsequently, with the last application nine months ago. After the first few treatments, the mass grew smaller, and appeared dark and necrotic. At this time there first appeared the opening in the palate which is now present. Rather profuse bleeding followed the earlier radium treatments, and the patient was admitted to the hospital several times because of hemorrhage. In 1923, his hemoglobin was 55 per cent, R. B. C., 2,130,000.

At the present time, there is a rather small, firm mass in the nasopharynx, and the patient's only apparent discomfort is due to the defect in the palate.

Tuberculous Ulcer of Nose. Dr. Herman B. Cohen and Dr. George W. Botts (by invitation).

S. S., male, age 68 years, presented himself at the Medico-Chi Hospital with the following history: One year ago a swelling of the left naris appeared and was followed by an ulceration covered by scabs, etc.

Present examination revealed an ulceration about 1 c.m. in diameter, a rather indurated border, the surface covered with grayish mucoid discharge. Small punctate hemorrhages. Smear was negative for Vincent's infection and positive for T. B. Wassermann test was negative. Few palpable cervical glands. Cauterization treatment is now being carried out.

Fracture of the Temporal Bone. Dr. Herman B. Cohen and Dr. G. W. Botts (by invitation).

Carl M., age 16 years, high school student. Previous history negative.

Present history: On Dec. 9, 1926, while coasting on a sled, he collided with another boy, and was knocked unconscious, remaining so for six or eight days. When he regained consciousness he realized that he was blind in the left eye, and had a very severe headache, which was followed by two spells of projectile vomiting at about two-hour intervals. After a lapse of six days, he had another attack of headache, followed by the same type of vomiting.

Sixty days later: Chief complaint, blind in left eye, unable to open right eye, unable to look up, down or to the left, and noises in the right ear.

Examination: On inspection there is a ptosis of upper right lid, left eye turned out. Right turned out, and its movements limited; he is unable to look up, down or toward the median line.

The ears and nose are negative on inspection.

Examination of ears for deafness: Right ear, watch, contact, whisper, 18 inches; spoken voice, 5 feet; Rinné test, negative—that is, bone conduction greater than air conduction. Schwabach test shows increased bone conduction of 14 seconds. Weber test, lateralized to the right.

Low tones lost, the first fork heard was C2, 512 D. V. High tones, all right. Hears 1024 D. V. quite well.

Left ear: watch, 30/30; whisper, 7 feet; spoken voice, 24 feet; Rinné test, positive 20B/40A. Low tones, good, 32 D. V.; high tones, good, 1024 D. V.

Tests of the vestibular apparatus: no spontaneous nystagmus, no vertigo, Romberg negative, pelvic girdle good; past-pointing touches with both right and left fingers:

After-turning: To the right, head 30° forward, horizontal nystagmus to the left; amplitude good; duration 27 seconds; past-points with right, 16 inches; with the left, 12 inches; vertigo 29 seconds. To the left, head 30° forward, horizontal nystagmus to the right, amplitude good; duration 26 seconds; past-points with right, 14 inches; with left, 20 inches; vertigo 28 seconds.

After douching: Right ear, head upright, water 68° F., rotary nystagmus to left; amplitude good after 1 minute. Head back 60°, horizontal nystagmus to the left; amplitude good. Past-points with right, 10 inches; with left 6 inches.

Left ear, head upright, water 68° F., rotary nystagmus to the right; amplitude good after 52 seconds. Head back 60°, horizontal nystagmus to the right; amplitude good. Past-points with right 6 inches, with left 4 inches.

Report from Wills' Eye Hospital: Left eye, vision nil, is turned out with upper lid drooping. Right eye, upper lid paralyzed and drooping, some move-

ment of the eyebrow. The movements of the eye limited to those controlled by external rectus and superior oblique, and eyes are turned out and down. The conjunctiva normal; cornea clear, pupil dilated 8 m.m., but reacts some, though not completely; lens clear, and fundus seems normal; V., 20/15, partial paralysis of facial nerve is evidenced on this side of face and mouth.

Left eye has far-away stare and no fixation. Movements of external ocular muscles unaffected. No external manifestations of injury. Iris of good texture and color; pupil, dilated, contracts consensually, but does not react to direct light. Lens clear; fundus shows a white disc, which has apparently undergone complete atrophy. Vision nil.

Diagnosis: Third nerve paralysis and left optic atrophy.

Neurological examination, Feb. 3, 1927: Objective examination: Obvious endocrine imbalance manifested by feminine distribution of hair and fat.

Cranial nerves: First, impairment of smell in both nostrils. Second, not tested. Third, paresis of right upper lid, probably slight weakening of left. Both pupils widely dilated and neither respond to light. Superior, inferior and internal rectus of right eye completely paralyzed. Movements of left eye O. K., all other cranial nerves O. K.

All extremities O. K., except for normally symmetrical increased tendon reflexes, but no clonus or Babinski. Bilateral olfactory and third nerve palsies. The optic not examined.

Comment: The boy undoubtedly had a fracture of the skull. He ought to be studied, but refuses to come into hospitals. He shows very poor judgment in many other ways, and, considering that he is rated the second year high school, it may be assumed that there is a beginning of mental impairment.

(Signed) Dr. Weisenburg.

X-ray report, Feb. 4, 1927: X-ray examination shows a fracture extending through the squamous portion of the temporal bone on the right side and extending forward as far as the anterior border of the sella. It is presumed that it has extended into the left of the orbit, but further study is necessary to prove this fact. Patient should be sent back for further examination.

(Signed) Dr. Pfahler.

Feb. 14, 1927: Further X-ray study fails to add any evidence with regard to extent of the fracture line into orbital wall.

DISCUSSION.

DR. RALPH BUTLER: With reference to the brain abscess case that was just shown, I would like to add that shortly before this case came into the hospital we had a similar case with pus coming through the tegmen. A drainage tube was inserted through the tegmen and about one week later the patient died. We felt at that time that insufficient drainage might have accounted for the poor result. For that reason the abscess in this case was drained through the squamous portion of the temporal bone. The dura was turned back and a coffer dam of iodoform gauze was made. Dakinization of the tissues was done for a long time, longer than would seem necessary to eliminate any possibility of failure. It may also be of interest to know that there was some superficial infection of the wound, which cleared up with quartz light treatment. There were no other complications noted except the facial twitching.

The case of fibrosarcoma of the nose was shown in this room about six years ago. He was one of three cases of malignancy demonstrated that evening. The other two were cases of carcinoma; one of the nose, the other of the nasopharynx. The latter lived for five years and died from extension of the growth. The former is still living and in fairly good health. Such cases illustrate what may be accomplished with radium in inoperable cases.

Pansinusitis After Operation. Dr. Samuel Ruff Skillern, Jr.

Mr. President, Guests, and Members of the Philadelphia Laryngological Society: I am going to deviate from the usual course in presenting this case, as I am going to allow the patient to do the talking and tell you his own history. Mr. G. is a well known lawyer from Trenton, N. J., and I think, without a doubt, he had the worst case of pansinusitis that has ever come into the Skillern Clinic, either as a private or a clinical patient. We started out

with a double ethmoidectomy and the enlargement of the sphenoid ostiums by biting away the anterior walls. At the same sitting the frontal ostiums were enlarged by the rasp.

The next operation was a double Caldwell-Luc, both maxillaries were found to be filled with polypi, and degenerated necrotic material and pus. As the frontal sinuses were not draining as they should, a double modified Lothrop was performed at a later date.

I think Mr. G. will tell you that he was suffering such unbearable pains, and that his mind and general nervous system were so affected that, at one time, he considered taking his own life to end it all. He had started his treatments with his own family physician, then he had gone to one laryngologist after another, with little or no relief, until he believed his condition incurable. As unbelievable and amazing as this statement may seem, even the chiropractors could not cure him. I shall now ask Mr. G. to give you a short resume of his condition.

Following this introduction, Mr. G. gave the history of his illness.

Fibroma of the Nasopharynx. Dr. Herman B. Cohen and Dr. James E. Brayshaw (by invitation).

T. C., male, white, age 39 years, occupation, janitor. Eleven years ago the patient first became aware that he had difficulty in breathing through his nose. A few months later there appeared a heavy discharge which, with the obstruction, grew worse, slowly but steadily. At times the discharge would be blood-tinged. There was no pain. Five years ago (a period of six years elapsing since the first symptoms were noted by the patient) he appeared at the Jewish Hospital, where he came under the observation of Dr. Herman Cohen. Disregarding any lesser pathology in the nose, on examination a very firm mass was seen in the postnasal space. It completely filled the space, having attachment to the vault, laterally and anteriorly, both choana being completely obstructed. A tentative diagnosis of fibroma of the nasopharynx was made; biopsy and examination proved this to be correct. The treatment decided upon was electro-coagulation. This was done on three occasions at short intervals. After the second treatment a large portion of the mass, at least one-third, fell away. The patient failed to appear again after the third treatment.

Three weeks ago, five years later, the patient came to the Medico-Chi Dispensary to see Dr. Cohen. He came because another portion of the mass fell away. Upon examination, the hard mass now is not causing any obstruction to nasal breathing; it is attached only at the floor of the nose at the junction of the hard and soft palates, and is mainly on the left side. Again electro-coagulation has been decided upon as the treatment of choice. Ten days ago this was done.

DISCUSSION.

DR. HERMAN B. COHEN: This man came to the Jewish Hospital six or seven years ago for his nasopharyngeal condition. He had the typical frog-faced appearance, slept constantly, no cerebation, nose full of a heavy mucoid discharge.

A part of the growth in the pharynx was removed and was reported as fibroma. Knowing the danger of the operation, hemorrhage, etc., we decided to use electro-coagulation. He received three treatments over a period of six or seven weeks, after which a piece fell out. He was then able to breathe through his nose and his general health was improved. Was not seen for three given ten days ago and next week he will get another. Conservative treatment years. He came again because another portion came off. One treatment was proved quite successful in this case.

Postdiphtheritic Cicatricial Stenosis and Atresia of the Larynx. Report of Two Cases. Dr. Louis H. Clerf and Dr. Fernand G. Eeman.

I take great pleasure in presenting tonight two cases of laryngeal complications following diphtheria. The interest of these two cases lies in the contrast between the similarity in etiology and the difference in the laryngeal lesions.

Both cases are chronic complications following laryngeal diphtheria; in both cases the complication is of an obstructive nature and partly, at least, due to

the process of healing. The difference between the two cases lies in the extent of the lesion and the method of treatment.

The histories of the two patients are almost identical; attack of severe laryngeal diphtheria, accompanied by acute dyspnea, relieved by intubation. Extubation being impossible in both instances, a tracheotomy was performed.

On examination of the larynx by direct laryngoscopy, a very marked difference was found between the extent of the laryngeal lesion in the two cases under consideration.

In one patient a subglottic stenosis, severe enough to prevent the patient from breathing comfortably through the larynx without the additional help of a tracheal cannula, but whose lumen was large enough to admit the passage of a Size 26, French scale, bougie.

In the other patient the laryngeal lumen had completely disappeared.

These two cases form extreme types; simple narrowing of the airway on one side, complete obstruction on the other side.

In the stenosis case, the narrowing is circular, ring-like, and involves only a small area of the subglottic region, leaving the vocal cords intact; whereas, in the case of atresia, a hard mass of fibrotic tissue, the consequence of hyperplastic cicatrization followed by retraction, suppressed all trace of airway.

In both cases the cartilaginous skeleton of the larynx was unaltered and this fact helped materially in the efficacy of the treatment and the obtention of a satisfactory end-result.

Histories: C. M., age 6½ years, had an attack of severe laryngeal diphtheria in April, 1925, two years ago. Antitoxin was given, but the dyspnea was acute and intubation was done. The intubation tube was left in situ for a period of four weeks, after which the patient coughed the tube out. Dyspnea became alarming and a tracheotomy was performed. Several efforts at decannulation followed, but the child could not dispense with the tube. The patient was brought to the Bronchoscopic Clinic of the Jefferson Hospital for examination and treatment.

External examination showed that a high treacheotomy had been performed, the fistula being at the level of the cricoid cartilage. A direct laryngoscopy for diagnosis was performed by Dr. Clerf. The report of the operation reads as follows: "The upper laryngeal aperture seems normal in appearance. There is some interference with motility of both cords. There was found extensive stenosis involving the subglottic tissues."

The patient was admitted to the Bronchoscopic Clinic about seven months after the original infection and a low tracheotomy, as the first step in the treatment, was performed by Dr. Clerf. A No. 3 tracheal cannula was inserted, leaving two uncut rings between the old and the new tracheal opening.

Direct laryngoscopic bouginage was started, using the Jackson rounded tracheal bougie. At the beginning of the treatment a Size 26, French scale, bougie could be passed without much resistance. There was no reaction following the dilatations by bougies and the treatment was carried out at regular intervals. At the present time a Size 33 bougie can be passed through the stenotic lumen and the patient is breathing perfectly comfortably through the mouth, although wearing a fully corked cannula. The patient's voice is normal. The patient is actually undergoing a "test period", after which the tracheotomy tube will be permanently removed and the fistula allowed to close spontaneously. A plastic operation may be necessary in order to obtain a perfect occlusion.

T. S., age 5 years, had an attack of severe laryngeal diphtheria at the age of 13 months. Intubation was done. Extubation was followed by marked dyspnea and a low tracheotomy was performed. The patient was brought to the Bronchoscopic Clinic of the Jefferson Hospital nine months later.

Direct laryngoscopic examination showed that the laryngeal lumen was completely closed at the level of the vocal cords. Laryngostomy, according to the Jackson technique, was performed by Dr. Clerf; the atresic way was divided and all the cicatricial tissue, which included the vocal cords, as well as the subglottic tissues, was excised and a pack was placed in the cavity. The packs were changed at frequent intervals and this treatment was continued until wound was completely epithelialized; about two months. A laryngostomy apparatus was then used. Total duration of treatment, thirteen months. In

time, a very satisfactory laryngeal lumen was established. The patient went through a "test period" and the result being maintained, the fistula was allowed to close. The patient developed a very satisfactory voice. The patient was discharged a few weeks ago and is to return at stated intervals for observation.

These two cases serve to illustrate various points in the etiology, diagnosis and treatment of laryngeal stenosis. Etiology: In both cases, the narrowing or closure of the laryngeal lumen followed an acute infection of the larynx treated by a mechanical intervention in the larynx itself; intubation. In both cases, extubation was impossible and a tracheotomy had to be performed. The mechanical manipulation of intubation with slight injuries to the laryngeal tissues, probably caused by it, may be considered as an added cause towards laryngeal stenosis, although a stenosis would probably have occurred in both cases, even though intubation had not been performed.

On one of the patients a high tracheotomy was performed as an emergency measure. (A high tracheotomy is only justifiable in an emergency.) According to Jackson, the most frequent cause of chronic laryngeal stenosis is high tracheotomy. In the case considered, the maintenance of a tracheotomic cannula passing through the cricothyroid membrane is perhaps partly responsible for the stenosis. In both cases a low tracheotomy done early would have relieved the symptoms of dyspnea, would have put the inflammatory larynx at rest, and would have avoided the additional laryngeal traumatism due to intubation. This surgical procedure might have prevented chronic laryngeal stenosis or atresia, or at least would have lessened the extent of the stenosis and the degree of narrowing of the laryngeal or subglottic lumen.

Diagnosis; importance of direct examination of the larynx with the laryngoscope. The indirect examination of the larynx of a child with the laryngeal mirror is almost always unsatisfactory. The direct laryngoscopic examination can easily be performed on a child in a very short time without the use of any anesthetic, and will give information concerning the laryngeal lesion, its location and extent, no other examination can furnish. There is no contraindication to laryngoscopy, which is, in expert hands, a minor procedure, hardly more distressing, if at all, than a mirror examination. Every laryngologist ought to master the technique of direct laryngoscopy. The exact determination of the laryngeal lesion, which direct laryngoscopy alone in many cases will make possible, will be of an invaluable aid in planning a treatment adequate to the case under consideration. Retrograde laryngoscopy with the Tucker retrograde laryngoscope will be of great help in determining the extent of the lesion from below.

Treatment: The two patients presented tonight are typical examples of the results which may be obtained by two different methods of treatment:

1. One method being dilatation by direct laryngoscopy and bouginage.
2. The second being laryngostomy, using the Jackson technique. We feel that the conservative method of treatment should be tried whenever the stenosis is not complete. The more so when the stenosis is not very marked or extends only over a short distance.

Cicatricial webs may be incised under direct laryngoscopy, prior to treatment by dilatation. If, after a period of fair trial extending over a sufficient length of time, no improvement in the local conditions of the larynx is noticeable, e.g., if a larger sized bougie than the one originally used at the beginning of the treatment cannot be passed through the stenotic area, one may consider that the conservative method has failed. Surgical treatment will have to be resorted to. Surgery will be the only treatment in the case of atresia and will consist in laryngostomy and excision of the obstructive tissues, care being taken nevertheless, not to remove part of the cartilaginous skeleton of the larynx.

The reconstructed airway has then to be maintained or to be further dilated; both these results will be accomplished by applying light but constant pressure to the inside of the larynx. The methods used towards that end will usually be, either packing of the laryngeal cavity or the wearing of a laryngostomy apparatus. When the epithelialized laryngeal lumen has been well established and maintained the patient undergoes a "test period" of a few months, after which the fistula will be allowed to close either spontaneously or through a plastic operation, Nassau technique.

The functional result in the two cases presented tonight has been very satisfactory; the stenotic case has a normal voice; the vocal cords were not involved in the stenosis, which was subglottic. The atresia case is developing a satisfactory voice, the phonation being produced by the vibrations of the ventricular bands, which have assumed the functions of the removed true vocal cords.

DR. LOUIS H. CLERF: Cicatricial laryngeal stenosis, postdiphtheritic in origin, as exemplified in the case of the patients so ably presented by Dr. Eeman is not so commonly observed as formerly. This is very probably due to the laryngoscopic aspiration of secretion and membrane now being practiced in many institutions.

This method undoubtedly decreases the need for frequent and prolonged intubation and often emergency tracheotomy, which too often is performed by splitting the thyroid or cricoid cartilages. In these cases of cicatricial stenosis, unassociated with extensive destruction of cartilage, a complete cure can practically always be obtained either by the conservative method of laryngoscopic dilatation or by the more radical procedure of laryngostomy. In the latter cases, time and patience are all important.

Dr. Eeman is to be congratulated.

DISCUSSION.

DR. P. S. STOUT: I should like to ask Dr. Clerf if he has seen any stenosis of the larynx following a properly done tracheotomy, and if he has not, if a tracheotomy would not be preferable to intubation.

DR. E. D. GUTTERIDGE: I thank Dr. Clerf very much for showing these two cases. I have seen a certain proportion of these diphtheria cases in Australia and there are also a considerable portion of these atresias. We owe a great deal of thanks and gratitude to Dr. Chevalier Jackson for his bronchoscopic and esophagosopic methods and for the work he has done, as the majority of textbooks pass these cases by with very little mention.

In reference to Dr. Skillern's case, Dr. Gutteridge said that he had just come from Rochester and he was particularly impressed by their conservative methods, because he thought that only in the Old World were they conservative. He wanted to know from Dr. Skillern just when radical procedures were to be used.

DR. SKILLERN'S reply to Dr. Gutteridge: With reference to your question of conservative treatment in our frontal cases, I would say that we always try the intranasal route first, enlarging the natural opening as much as possible. Of course, it should be remembered, too, that usually after these openings scar tissue results, which defeats our very purpose, sometimes causing an atresia. In those cases we do our radical work. We have done away almost entirely with the Killian method, and do a modified Lothrop operation. This consists in opening up the frontal sinus above the supraorbital ridge, breaking through the intrasinus septum, chiseling off the spine of the nasal bone and enlarging the frontonasal opening. Good results are always obtained by the method. In closing, I would say that, with reference to Mr. G.'s case, his nose is practically well. He still has what we think is a frontoethmoidal cell that has proper drainage, but the mucosa is in all probability somewhat infected, as indicated by the discharge. He is now being treated with hot silvol, which keeps the mucous membrane shrunk and is gradually clearing up his symptoms.

DR. CLERF'S reply to Dr. Stout: If the tracheotomy has been properly performed, there will be no cicatricial stenosis of the larynx; if, however, the cannula is placed through the thyroid or cricoid cartilages, or even the first ring of the trachea and permitted to remain at that level, stenosis will surely ensue.

Projecting or "Lop-Ear"; Report of a Case Corrected by Plastic Operation.

Dr. Arthur J. Wagers.

This auricular deformity, if extreme, is usually of congenital origin. It may, however, be acquired to some degree by habitually placing the cap or hat on the head of a child in such a manner that the auricle is pressed downward and forward.

While the auricular malposition may in no way affect the hearing, it does become a conspicuous feature, even grotesque in some instances, rendering the unfortunate possessor of such ears the subject of many alleged witticisms.

Particularly is this true in the case of children whose schoolmates take no thought of the mental torture their jibes inflict in the mind of their "lop-eared" companion.

Because of this fact alone, if for no other reason, any operation calculated to restore the conspicuous auricle to its normal position on the head is clearly indicated and perfectly legitimate.

The case herewith reported was referred by Dr. Jackson Taylor. The child, a boy, age 5 years, was brought by the mother, who stated that he had always been healthy and normal in every way except for the projecting ears, which abnormality had been present from birth.

The malposition of the right auricle was considerably more marked than that of the left, as is shown in the accompanying photographs taken at the time of examination.

The right auricle stood straight out from the side of the head and the upper portion inclined forward and downward. The left auricle presented a more normal appearance, although the outward projection was noticeable.

This boy would be entering school in another year and the mother, realizing the endless torment to which her child would be subjected, earnestly desired to have the deformity corrected. The patient was therefore admitted to the hospital.

Operation: The head was prepared as for a double mastoid operation. The right ear was taken first. An elliptical area of skin, including the auriculo-mastoid junction and a proper amount of skin extending back over the mastoid and forward over the posterior auricular surface was removed. The next step consisted in the removal of a kidney-shaped area of auricular cartilage of approximately the same extent as the denuded area. The skin and perichondrium was elevated from the anterior surface of this section of cartilage in much the same manner as we elevate the mucous membrane and perichondrium in the submucous resection of the nasal septum. The exercise of considerable care was required to prevent tearing or puncturing the anterior auricular skin. The cartilage having been removed, silkworm gut sutures were so placed as to bring the edge of the remaining auricular cartilage in contact with the posterior portion of the denuded mastoid area. Four of these sutures were used, the upper one being so placed as to produce upward and backward traction on the auricle. The skin edges were approximated and held with black silk sutures.

Operation on the left ear was done in a similar manner, except that a much smaller portion of auricular cartilage was removed.

Dressings and bandage were carefully placed in an endeavor to prevent any forward or downward traction during the process of healing. Some of the skin sutures were removed on the fifth day. All sutures had been removed by the seventh day.

The photographs taken three weeks after operation show the resultant change in the child's appearance.

Comment: Strict attention to asepsis must be observed, not only at the time of operation, but during the process of healing as well.

Should infection of the auricular perichondrium occur, there would be great danger of the entire supporting cartilage becoming absorbed, leaving the auricle as a withered, shapeless appendage.

As to the exact size and position of skin and cartilage to be removed, no specific directions can be given. The operator must rely on his own judgment in the individual case.

Ethmoiditis with Perforation of the Skull at the Pterion; Report of a Case. Dr. Robert J. Hunter.

On Nov. 6, 1924, Mrs. B., age 21 years, consulted me for pain in the forehead and left temporal region of one month's duration. There was a history of recent cold in the head of one week's duration, but she had had catarrh "for a long time". There was some swelling over the left temporal region, but no discharge in the nose. In two days she returned, much improved. The swelling was gone and there was a free discharge of mucopus from the nose. On Nov. 15, there was a discharge of typical creamy sinus pus from the left side of the nose following treatment in the office, which immediately relieved the headache, but the temporal region continued to swell. The pus came from

under the middle turbinate anteriorly. Transillumination of the antrum and frontal sinuses was negative. The antrum was washed and found normal. X-rays of the sinuses showed an area of bone erosion back of the rim of the orbit, otherwise negative. These X-rays are the best I have ever seen when viewed stereoscopically. One can look right into the head apparently. Nevertheless, when viewed separately, the erosion appears on the plate where it was found at operation, but viewed stereoscopically it appeared to be a left frontal cell separated from the main sinus by a septum. We incised through the eyebrow, found the frontal sinus normal, continued the incision downward a little and retracted the tissue until we reached an area in the temporal fossa above the middle of the zygoma, where we found a dehiscence in the skull about $\frac{3}{4}$ -inch in diameter, with granulation tissue filling the defect. This was removed, exposing the dura. The diseased bone around the opening was removed and also some from the roof of the orbit, which was found necrotic, with considerable granulation tissue. The wound was closed with subcuticular stitches. There was very little scar. There was no evidence of tuberculosis, the blood Wassermann was negative, W. B. C., 11,800. Polymorphonuclear leucocytes, 60; small lymph, 38; mono., 1; eosin., 1 per cent.

After finding that the diseased area had no connection with the frontal sinus, I considered whether the disease could have extended from an unusual sphenoid or could be an example of isolated osteomyelitis of the skull. After looking the matter up in the dissecting room, where I repeated the operation on several skulls and followed the area that was found diseased a little deeper, I came to the conclusion which I believe to be correct, that this was a case of involvement of an orbital ethmoidal cell. I do not have a specimen illustrating orbital ethmoidal cells, although one of our postgraduate students found a beautiful one several years ago. I submit for examination two specimens which show large frontal sinuses extending almost over to the pterion.

Acute Alcoholism with Hemorrhagic Spinal Fluid and Total Loss of Hearing; Report of a Case. Dr. Robert J. Hunter.

This patient was brought to the Philadelphia General Hospital on Dec. 24, 1925, in a delirious state. He had evidently been imbibing freely and was admitted to the drunk ward. There the interne discovered that his mental symptoms did not correspond with delirium tremens. He was restless, talkative and delirious. He would not stay in bed. He said he had been drinking "bad hooch". Physical examination was unsatisfactory on account of this continued movement and shouting. There was no great tremor and no hallucinations. He complained of pain when the head was flexed and was hypersensitive everywhere. Two days later he had become quiet. Kernig's sign was marked, and he had a marked Tache cerebrale, and Dr. Burr confirmed Dr. Doane's diagnosis of meningitis—cause unknown. The patient was now quiet enough to do a lumbar puncture, 25 c.c. of spinal fluid were withdrawn under a little pressure. It was uniformly bloody, showing 340 white cells and myriads of red cells. The leucocyte count was 20,300, with 82 per cent polymorphonuclear leucocytes. General physical examination revealed old healed tubercular lesions at both apices, but it was otherwise negative. The urine was normal throughout his illness. His temperature dropped from 101° to normal and remained so after the first two days. His pulse varied from 100 to 60. The patient then improved decidedly for a couple of days, but on Dec. 29, became stuporous and could only be aroused with difficulty. Paralysis of the left seventh nerve was noted. The eyes showed a slow nystagmus, with conjugate deviation to the left. Dr. Shumway found the ocular veins congested, rotation of the eye muscles normal, pupils were equal and reacted to light and accommodation. His eye grounds showed nothing. There was no choked disc. X-rays of the skull and cervical region were negative for fracture. A second specimen of the spinal fluid (20 c.c.) was withdrawn, with the same findings. Following this the patient woke up. Then in a few minutes he developed a weak and rapid heart action and Cheyne Stokes respiration, which was treated with atropin and adrenalin. A surgeon was called in to see him from the standpoint of cerebral hemorrhage. He advised waiting. The blood count came down to 7,600; polymorphonuclear, 60; leucocytes, 34; mononuclear, 3; basophiles, 1.

Cultures on various media from both spinal tapplings were reported normal, and the diagnosis of hemorrhagic meningitis due to alcoholism was determined. He left the hospital cured of the meningitis, but unable to hear, on Feb. 2, 1926.

I first saw this patient on Jan. 9. It was necessary to communicate with him in writing. He was intelligent and wrote well. He said that once, some years before, he had gone deaf from drinking whisky, but had recovered. He said that his hearing had been all right when he started on his spree. His eardrums were normal. He gave the fork test for nerve deafness. He could barely perceive sound, but could not understand the loudest shout. In the right ear, his caloric test showed all pathways functioning, but with a marked diminution of irritability. The left ear was totally dead to caloric stimulation. There was no evidence of facial paralysis. On Jan. 29, the galvanic current applied to both eighth nerves gave nystagmus.

I have been unable to get in communication with this patient to see if his hearing has again improved as it did after his first experience, but I fear that it has not. The involvement of the left seventh, with no Barany response and no hearing would, of course, indicate pressure at or near the left internal auditory canal. The facial paralysis, however, cleared up when his meningitis symptoms subsided, and the galvanic test indicated that his vestibular nerves were intact, thus making it probable, that this patient had an acute toxic hemorrhagic bilateral labyrinthitis, in which the right semicircular canals alone escaped. I do not know how much credence we can give to the patient's statement that he had been deaf following a former spree and had recovered. The possibility of a similar pathology in the eighth nerve to that seen in amblyopia from wood alcohol must be considered. There may have been an injury of the brain or fracture of the skull from a blow or fall, not recalled by the patient and not showing on examination.

High CerebroSpinal Fluid Cell Count; Recovery; Report of a Case. Dr. Robert J. Hunter.

J. P., age 10 years, had been treated by me for otorrhea for two years. He had had it since 2 years of age. On Aug. 14, 1924, he came to my office for a routine visit, with the statement that the ear was better; not running so much now. As we finished treating the ear, his mother said, "By the way, I know you do not take other than nose and throat cases, but could you give John a pill for his headache? He was sick last week and still has a very bad headache. He cries with it."

The history was elicited as follows: On Aug. 6, he went to the movies, apparently in good health. He was barely able to reach home. He collapsed in the hallway "from the intense heat." He vomited profusely, was drenched with sweat and very dizzy, was unable to get upstairs. He was put to bed and remained there all the next day. Very dizzy. He vomited if he raised his head. Severe pain across the forehead. Two days later he was "doubled up" with pain in the side and back and it "hurt him inside to laugh." He was feverish. On Aug. 12, six days after onset, the headache recurred in front and top of head after playing baseball, and he spent Aug. 13 in bed with head ache. Aug. 14, he said his head aches if he shakes it. He had not been attended by a physician.

Physical examination showed no tenderness over the mastoid, no dropping of the posterosuperior wall; some discharge in the ear, but less of this than usual. The pupils were equal and react to light and accommodation. There was no asymmetry; Babinsky, ankle clonus, Kernig's or stiffness of the neck. The reflexes were normal. The temperature and pulse were normal, with the exception that at 9 o'clock the first night in the hospital it was 100°. Just headache, that is all. I sent him to the hospital immediately and withdrew a specimen of spinal fluid. The tap immediately relieved the headache, the only symptom he had, and it never returned. The count was 890 cells, mostly polynuclear. The fluid reduced Fehling's solution. It had a ground glass turbidity. The culture was sterile. The white blood count was 7,800, hemoglobin, 80 per cent. A second examination of the spinal fluid showed 440 cells. The urine was negative. X-ray showed a diseased left mastoid. A small postule on the right

knee was cultured, showing a growth of pure staphylococcus. A third count four days after admission showed 190 cells. A fourth count was refused by the parents, who could see no excuse for keeping a well child in the hospital. He was kept in bed at home for a week. The headache never returned. His ear still runs upon occasion, but is greatly improved, having been dry for nine months at a time. He is in excellent health at this date, March 25, 1927, with hearing in the affected ear that is only very slightly below normal and no discharge of pus. I have not examined his vestibular tracts.

What was the nature of the acute illness that he had on Aug. 6? It would seem that either a sterile abscess ruptured into the cerebrospinal system or that the necrotic process in his ear spread some at that date, causing a localized meningitis, from which he recovered. If he had an acute labyrinthitis on that date, his cochlea certainly escaped, as he never had any increased impairment of hearing. Although he was said to have been feverish when he was suffering from vertigo, vomiting and sweating, it seems extraordinary that he should have 890 cells per c.c. in the spinal fluid and suffer no more inconvenience than a headache.

DISCUSSION.

DR. N. W. WINKLEMAN: The history given by Dr. Hunter in the alcoholic case is quite characteristic of what is now a well recognized clinical and pathological entity; spontaneous subarachnoid hemorrhage. Neurologists have recently had their attention focused on it because of its not uncommon occurrence. In this condition the onset is sudden, with evidences of meningeal irritation and with free blood in the spinal fluid. Cranial nerve defects may occur. Repeated attacks are not unusual. For the most part the basis is an intracranial aneurysm, which in contrast to aneurysms in the body are not syphilitic.

DR. SKILLERN: Dr. Hunter speaks of the frontoethmoidal cell: I believe, personally, that nine-tenths of the failures in operation on frontals are due to not getting into that frontal cell. I remember one case we had in the hospital. He had been operated on previously and had been well for a period. On readmission to the hospital he was delirious and showed signs of meningeal irritation. At the time of operation the floor of that frontal sinus was as clean and as white a bone as I ever saw. After going through the old scar and opening up the wound, it was found that the floor of the frontal sinus was of a nasty bluish color. I took my curet and palpated the floor, and the curet went right through. There was a supraethmoidal cell that extended beyond the end of the eyebrow and was filled with pus that was being absorbed, causing these meningeal symptoms. We have made it a rule to inspect the floor very carefully; and if we do break through it, we have not done any harm. I believe a great many failures are due to not getting into this supraorbital cell.

DR. ROBERT J. HUNTER: I was very glad to hear Dr. Winkelman talk, because he speaks with authority on the question of meningitis, whereas my experience is limited from the standpoint of pathology. As to the ethmoidal cell, I did not mean the same thing as Dr. Skillern. The ethmoidal cells I spoke of are those that, in rare instances, go across the top of the orbit. If you will look at these specimens that I have shown, illustrating large frontal sinuses, you can see clearly that it would be very easy in chronic frontal sinusitis to overlook the infection in that very narrow part posteriorly, where the upper and the lower border of the sinus are in close proximity, and report such cases as an ethmoidal cell.

A Case of Mastoidalgia Apparently Cured by Simple Mastoidectomy. Dr. William Francis Whelan.

Although mastoidalgia and otalgia, or pain in the mastoid region and in the ear, referred in origin and not due to inflammation or new growths, are not uncommon, the conditions causing this referred type of pain do not appear to be too well understood. It is quite true that the descriptions of otalgia and mastoidalgia in textbooks leave much to be desired; in fact, very little is mentioned about the subject.

A careful examination of the mechanism of the ear with a head mirror and reflected light, together with a complete study of stereorentgenograms of the mastoid, and laboratory tests of the blood, etc., will dispel the idea that inflammation causes the pain in the ear and the mastoid.

Wilson, in discussing the subject, says: "In the ear, with its nerve supply from many sources, pain not only suggests the region particularly involved in the inflammatory process, but also makes a constant demand on the physician to deal with referred pain and to interpret its significance."

For anyone interested in a careful detailed study of the sensory nervous mechanism of the ear and mastoid, J. Gordon Wilson's comprehensive article, "Pain in the Ear and Its Diagnostic Significance", will be of interest. According to this author, in the majority of cases the pain is referred along the third division of the fifth nerve, less often along the second, and rarely along the first, the most common site being in the auriculotemporal nerve of the third division. At times the pain is referred to a posterior area, where no difficulty is found in associating it with the great auricular nerve, which comes from the second and third cervical nerves of the cervical plexus.

Sluder describes the syndrome associated with disturbance of the sphenopalatine ganglion as follows: "The pain begins at the root of the nose, in and about the eyes, the upper jaw and teeth, sometimes also the lower jaw and teeth, and extending backward to the temple and about the zygoma to the ear, making earache; emphasized at the mastoid, but always severest at a point 5 c.m. back of that. Then reaching backward by way of the occiput into the neck, and so on" . . . He also points out that most of these cases of mastoidalgia and otalgia can be controlled with cocaine injected through the nasal ganglion. The exception to this is any condition in which there is reason to believe that the cocaine will not be absorbed. Furthermore, in his clinic and private practice he finds that the pain of otitis media suppurating under pressure, may also be controlled by cocaine of the nasal ganglion, and in some cases in which the landmarks on the drum are more or less obliterated, accompanied by tinnitus, both the pain and the tinnitus are relieved by anesthetizing the nasal ganglion. In the case I am about to report it would have been interesting to have cocaine of the sphenopalatine ganglion and the results noted, but unfortunately this was not done.

Report of case: Miss H. F., age 26 years. In February, 1926, the patient developed severe pain in the left mastoid region. She was taken to the Pennsylvania Hospital, where she was observed for several days. Examination of the ear failed to reveal any evidence of mastoid disease. X-ray study of the mastoid also was negative. The leucocyte count was 8,000. The patient was discharged from the hospital, improved and with a diagnosis of neuritis of the left mastoid. In December, 1926, ten months later, the pain in the mastoid returned, together with some stiffness in the left side of the neck and pain on moving the head about. She was then sent to the Presbyterian Hospital and there remained for four days. Again the findings were negative and again a diagnosis of neuritis of the left mastoid was made. She was discharged as improved.

In January, 1927, the pain returned and the patient was admitted to the Medico-Chi Hospital. On admission the temperature was normal, and examination of the left eardrum and left external auditory canal was negative. There was tenderness over the mastoid on superficial and deep pressure. The auricle also was painful when manipulated. The right ear and mastoid were negative. Examination of the nose showed nothing unusual. Tonsillectomy had been done five years ago. The blood count showed 3,660,000 red blood cells, 8,600 leucocytes; hemoglobin, 70 per cent; differential count: small lymph,

32 per cent; polymorphonuclears, 66 per cent; eosinophiles, 2 per cent.

Urine examination negative.

X-ray report: Stereoscopic examination of both mastoid processes revealed no evidence of disease. The cell walls were clearly defined and there was no evidence of breaking down, or anything to indicate bone necrosis.

The patient was observed for a few days, and treated with opiates when the pain was severe. On Jan. 27, 1927, a simple mastoid operation was performed.

The mastoid was found to be perfectly normal, that is, there was absolutely no congestion in any of the cells. The septa between the cells were clearly outlined, the mucous membrane was thin and pale pink in color, no bogginess could anywhere be discerned. Recovery was uninterrupted. She was discharged from the hospital, Feb. 10, 1927, absolutely free from pain and has been under observation since the operation. Up to date, there has been no return of the pain. The hearing in both ears is normal.

DR. HERMAN B. COHEN: The pain in the region of the mastoid, which Dr. Whelan correctly says to be mastoidalgia instead of otalgia, brings up the question of sphenoiditis and should be truly investigated as such.

It must be remembered that sphenoid infection, particularly the latent type, can refer pain to the mastoid and is often the cause of mistaken diagnoses.

DR. ROBERT J. HUNTER: These cases of mastoidalgia are very illusive and difficult to diagnose. I had one case in which we thought there was some lesion. She had a facial paralysis. I operated on her, found a normal mastoid and, thinking the paralysis due to some swelling in the Fallopiian canal, I exposed it, releasing a drop of clear fluid. Following that, her pain and facial paralysis cleared up. Her pain returned, however, and was very severe over the mastoid and has persisted. I really believe now that this was a case of hysteria when I operated on her.

Some years ago, Ramsay Hunt brought out the theory that the cranial nerves had their motor and sensory roots, just like the spinal nerves. He thought that the geniculate ganglion of the facial nerve contained sensory fibres coming through the Pars Intermedia of Wrisberg, corresponding to the ganglion of the posterior root. He described cases of facial palsy, pain in the ear, with herpes in the posterior part of the exterior auditory canal, due to inflammation of this ganglion. I had a case with these signs and also herpes of the buccal mucous membrane and vestibular symptoms. Several of the cases mentioned by Hunt had vertigo, but no special study of it was made in those days. Dr. Mills, however, has always maintained that these cases are due to an involvement of the ganglion of the fifth nerve and also the seventh, and this view is, I think, now generally accepted.

I have relieved a number of cases of pain in the ear, unaccompanied by visible signs of inflammation, by blocking the sphenopalatine ganglion.

There are reports of mastoidalgia being cured by sympathectomy of the carotid. I have had no personal experience with this.

DR. P. S. STOUT: It is not best to operate on a normal mastoid, no matter how much the patient may complain of pain. I will mention a case of a young girl, which I will report in greater detail some time later, but I will give you a synopsis of the case. This young girl's trouble started in 1919. She came to the hospital with a history of some chronic trouble with both ears and a great deal of pain. X-rays showed but slight sclerosis of both mastoids. Because of these severe pains she was unable to work, having been sent to the hospital by the department store where she was employed. A radical mastoid operation was done on one ear. This started her on an operation debauch. Some time later she had the other ear operated upon. Following this second operation she was struck by a taxicab and her skull was fractured. The fracture extended to one of these operative fields. She was ill for a long time after the accident and during this time she had a decompression operation done. After this, she went to another hospital and had a third mastoid operation done. They operated on the side opposite to where the fracture had been. Later she returned to me and I found her in a frightful condition, a complete nervous wreck, complaining of pains all over her head. One hospital stated that she was a dope fiend and a neurotic. I do not believe that she was a dope fiend; her family watched her very carefully for some time and did not find the slightest evidence, but she was very neurotic. After she had been plainly told that there would be no more operations she recovered very promptly, took up nursing and is now very happy.

Meeting of May 3, 1927.

COLLEGE OF PHYSICIANS.

Nasal Lamp. Dr. Jay N. Fishbein.

This nasal lamp is useful in examinations of the deeper portions of the nose and the nasopharynx, which the head mirror fails to illuminate properly.

It consists essentially of a carrier and two lamps and a sliding piece. One of these lamps is placed on the upper portion of the carrier and the other at the end of a curve which is parallel to the carrier, so that the light of both lamps is thrown forward.

The nose is prepared by spraying with a 1 per cent cocaine solution. The lamp is inserted in the right naris, similar to that of the Eustachian catheter, except that here the curve is kept upwards. It is passed with its flat side against the septum, into the nasopharynx, and then rotated towards the patient's left and drawn forward so that it straddles the septum. After the lamp is placed in position, the sliding piece on the carrier is brought up against the upper lip, and fastened by a small screw in the outer part of this piece, where it is out of the way. The lamp is thus secured in position and rendered self-retaining. A single dry cell battery will furnish sufficient illumination, or the lamp can be used with a rheostat.

The lamps generate no heat, so this factor can be disregarded. Its use is limited to from 60 to 70 per cent of all cases, as extreme deviations, ridges or spurs may prevent its insertion. It has its value mainly in examinations of the deeper portions of the nose and nasopharynx. It is also useful in short operations, as the removal of polypi, where the light from the head mirror may be obstructed. It aids in the inspection of sinus discharge, and in diagnosing the sinuses involved. The lamp can also be used for transilluminating the ethmoid and maxillary sinuses, where it offers the advantage of transilluminating both sides simultaneously, thus offering the opportunity of comparison.

It can be used in submucous resections, in correcting the posterior deviations, or to check up after the operation has been completed. With the carrier in the right naris, the left one is left entirely free for any operative work necessary. In the right naris the carrier lies on the floor of the nose, out of the way, and also offers little difficulty as far as obstruction is concerned.

Description of the lamp: The carrier is 12.5 c.m. long, with the smallest possible diameter of 2 m.m. The lamps were constructed as small as possible, to facilitate manipulation in the nose, and are 9 m.m. long and 2 m.m. in diameter. In appearance they are similar to the Jackson lamps used in bronchoscopy, except that the bases are only half the size, or 4 m.m. They carry $1\frac{1}{2}$ volts, and do not generate heat. The distance between both lamps is 3 m.m., which allows sufficient space to straddle the septum. The greatest width of the lamps is 7 m.m., which constitutes 4 m.m., the diameter of both lamps, and 3 m.m., the space between them.

The sliding piece used to fasten the lamp against the upper lip is 7 m.m. long. The lamps may be protected by the insertion of shells over them, which covers the lower half of the lamp and also adds to their strength and protects the mucous membrane from any possible injury that may be caused in inserting it. It also causes all the light to be thrown upwards.

The Combined Ethmoid and Vomer Forceps. Dr. J. N. Fishbein.

This forceps was made with the purpose of eliminating the use of the chisel in submucous resection as far as possible and in reducing the number of instruments usually found necessary in performing this operation.

The procedure is carried out in the usual way. The mucoperiosteum is peeled off the cartilage on both sides and the cartilaginous portion removed with the Ballenger swivel knife or this may be dispensed with and both the cartilaginous and the bony portions of the septum be removed with the forceps. The forceps is carried back as far as the deformity exists and the perpendicular plate removed with upward biting edge, and the Vomer removed with the lower biting edge. Any deep lying spur which would ordinarily be rendered inaccessible to the ordinary forceps, due to the nasal spine of the superior maxilla, can be removed with the lower biting edge, which projects 3 m.m. below the arms of the forceps. The portion grasped by the forceps is given a slight lateral

twist to detach it and then removed with the Luc forceps. This septal forceps will remove many spurs or ridges inaccessible to other forceps, thus rendering the use of the chisel unnecessary in these cases. With the forceps, the thickness of the bone matters little. It bites equally well with thin or thick bone.

The disadvantages of the chisel are too manifest to be considered here in detail. Most important is the effect it has on the patient, since the majority of these operations are performed under cocaine. There is no part of the operation the patient dreads as much; some shrink before the blow is struck. For the patient it is an actual ordeal. The other dangers are real; namely, first, the possibility of the tip of the chisel breaking off and often actually becoming lost. Second, the danger of perforating the mucous membrane with the chisel itself, or in removing the detached portion. This forceps will probably both facilitate the submucous operation and diminish the number of instruments usually found necessary to perform it. It will remove the semblance of brutality attending these operations in the eyes of the patient, due to the use of the chisel and mallet, simple as the procedure may be in the hands of a skillful operator.

Description of the forceps: It has the Jansen-Middleton handle, with the double hinge action, which makes for considerable strength and crushing force. The blades are as close to the first hinge as possible, thus adding to their strength and efficiency. The blades themselves are 9 m.m. long and 9 m.m. deep, of which 3 m.m. project below the depth of the arms and it is this projection which makes possible the removal of the Vomer. The space between the blades is 4 m.m., which, together with their thickness, giving a total width of 5 m.m. The purpose being to keep the width of the blades as small as possible, depending mainly on the mechanical construction to furnish the crushing force and not on the thickness of the blades or the sharpness which the angle of the biting edge forms with the blade. These blades interlace, which tends to keep them in line. The tips of the blades are carefully rounded to facilitate insertion between the flaps, but do not approximate at the tips, in order that they should not detract from the force.

Light Therapy: Its Indications and Method of Application in Otolaryngology. Dr. Maurice Weisblum.

(To appear in a subsequent issue of THE LARYNGSCOPE.)

DISCUSSION.

DR. A. SPENCER KAUFMAN said that he had not used the infrared light because it did not apply to nose and throat work as much as the quartz lamp. The quartz light was a valuable adjunct in the treatment of ear, nose and throat conditions, but it took a lot of time, and for that reason he had not employed it as often as he might. He agreed with Dr. Weisblum in that it was absolutely necessary to cleanse the crusts and secretions from a given surface before one could apply the treatment. He said that in chronic suppurative otitis media the ultraviolet ray was of value in a certain percentage of the cases. He recalled a paper which Dr. Wagers had presented in this connection. Dr. Kaufman emphasized the fact that often we did not get improvement, because the quartz rod must be placed firmly against the mucous membrane to accomplish the desired results and the patients were apt to move away.

In atrophic rhinitis good results were to be had by persistent treatment. Involvement of the cervical glands, due to infections of the nose and throat, and trachitis are two conditions that yield in almost every instance. He did not feel that calcium was increased, but the application of the light produced a calcium fixation in the tissues. He mentioned the value of the exposure of the entire face to the air-cooled light, in the treatment of accessory sinus conditions and of local applications of the Kromayer light; but the efficiency of this latter method is interfered with by the application of cocaine or adrenalin. When the entire face is exposed, the eyes may be protected by a small piece of black paper or cloth, held in place by a strip of adhesive plaster, instead of using the goggles.

DR. G. W. MACKENZIE: I wish to endorse practically everything that Dr. Weisblum has said about the therapeutic value of light treatment. The subject has appealed to me for several years. The three forms of treatment that

impress me most are: first, the carbon arc light, especially with the carbons impregnated with molybdenum and iron; second, the air-cooled mercury vapor quartz lamp; and third, the water-cooled mercury vapor quartz lamp. Of the three forms of light treatment, I feel that the arc light is more often indicated than mercury vapor light, especially since it has deeper penetrating power. Since I have been using this form of light therapy I feel that the acute inflammatory conditions of the sinuses and the ear have responded better than before we began its use. In fact, I recall cases with retroauricular fistula that existed for a long time following a mastoid operation that healed up with this form of treatment. The air-cooled mercury lamp, as I understand it, is a form of general treatment that increases resistance of the individual by improving the metabolism, increasing the fighting force of the body (leucocytes and lymphocytes), and by helping to fix better the calcium contents, as well as the other essential minerals. Its penetration, as pointed out by the essayist, is not deep, nor is it necessary, since its action is upon the superficial capillaries. The effects of the water-cooled mercury vapor lamp is more circumscribed and is dependent upon bringing the light to a definitely fixed focus, applying pressure to produce a circumscribed ischemia so as not to allow the circulating blood to carry away its effects, as happens in the case of the air-cooled lamp. There is one effect of the water-cooled lamp that appealed to me very decidedly, and that is its use in pyorrhea alveolaris. Pyorrhea is perhaps one of the most stubborn diseases to treat; it is almost impossible to reach the capillary space between the teeth and their sockets with any form of antiseptic. Light treatment, because of its penetration beyond the surface, promises some hope in this class of cases. We have been sending our patients with pyorrhea to Dr. Lloyd Strohman and as far as we can see up to the present time the results have been satisfactory. Unfortunately, the quartz glass applicators are difficult to apply in all cases where the surface indications call for this form of treatment. This same obstacle arises in the treatment of sinusitis. In the first place, in the treatment of sinusitis, for instance the maxillary, it is impossible to bring the end of the applicator in contact with all parts of the mucous membrane lining the cavity, unless pressure is used, the results are not the most ideal. The same difficulty arises in the treatment of ear conditions; for instance, pressure sufficient to produce ischemia would, in many cases, prove too dangerous.

Light treatment is still in its infancy and from the results thus far obtained, it promises to be of considerably increased value in the future.

DR. WM. G. SHEMELEY: The statement was made that this treatment was not to be preceded by shrinkage of the mucous membrane. I was surprised to hear that statement, because I reasoned that one might secure better results by shrinking the mucous membrane before the treatment. I understood that it was necessary to keep the quartz light in firm contact with the tissues in order to produce an artificial ischemia, thereby preventing the rapid absorption of the blood stream. For this reason it was thought that by causing an artificial ischemia from shrinking the mucous membrane, one might also prevent this rapid absorption of the rays.

DR. WEISBLUM: The difficulty of holding the electrodes that Dr. Kaufman spoke of could be easily overcome by the assistance of a trained nurse or technician. With reference to the question of using pressure and producing ischemia, our answer is that we desire pressure and ischemia, because then we believe that penetration is two or three times as great. In the use of the applicators it must be remembered that most of the rays travel in the direction of the instrument and not at right angles. Some of the rays that emerge at right angles are not nearly as powerful as those that travel on a straight line. In treating the accessory sinuses a large lamp is used so as to cover the entire face and take in all the sinuses. It is very difficult to say just how the good effects are produced here. Care should be taken that the eyes are well protected. This can be done easily with a covering of wet cotton.

In answer to Dr. Mackenzie's question as to the depth of penetration of the ultraviolet ray, I would say that it is about one-thirty-second of an inch.

It is very difficult to say, however, just how the good results are brought about. My own idea is that it might be due to the ozone generated in the vicinity of the lamp.

A Note on Diphtheria in a Public School. Dr. Wm. Hartz.*(To appear in a subsequent issue of THE LARYNGOSCOPE.)*

DISCUSSION.

DR. HENRY S. WIEDER: I have had in the past a rather long experience in this line, having spent nine years with the bureau of health, and I have had almost an exact duplicate of the experience Dr. Hartz gave tonight. In one school I had about thirty cases of diphtheria develop within two or three months. We closed the school, cultured everyone, and excluded about fifty people, who were not returned to school until they were negative. We had no more cases for the rest of the winter. I am surprised that Dr. Hartz did not call attention to a most important phase of diphtheria from the standpoint of school contagion, that is, nasal diphtheria. When there is a case of nasal diphtheria (and there are many of them), the case will be in the school, spreading diphtheria, three or four weeks before it is detected. About fifteen years ago about thirty cases came out of one public school from one case of nasal diphtheria. I had only two cases of nasal diphtheria reported by private physicians in nine years. All the rest came from the dispensaries. Nasal diphtheria is a condition easily recognized, but not thought of by the general practitioner, and the most important form of diphtheria from the public health standpoint of the spread of contagion.

DR. GEORGE E. JOHNSON: I might ask Dr. Hartz what percentage of positive cultures were given the guinea pig test.

DR. HARTZ: I cannot tell you as I had to work fast to clear up the condition in the school, and I did not find time to follow up laboratory tests.

DR. PHILIP STOUT: I noticed we had the same trouble with the adults that you had in the school. Frequently the adult is the carrier. A number of years ago in a nursery we had one diphtheria case after another. We had everyone cultured in the case. A child's nurse was the carrier. In the Presbyterian Orphanage we had some cases. One was caused by a relative, who came to see a small child and so carried the diphtheria to the child. I do not think we get the typical diphtheria in cases that we have immunized. We do have the choking symptoms, and in one case we had to work quickly and do a tracheotomy or the child would have died.

DR. HARTZ: I do not have the information as to the percentage of children who have been immunized with the antitoxin. However, everyone of the children that received it lacked some few days or two weeks of six months to make the immunization complete. I think about 40 per cent of the total school population received three doses of toxin-antitoxin in this school.

An Interesting Case of Acute Mastoiditis. Dr. Albert L. Ussat (by invitation).

The following case is reported because of certain features it presented, causing temporary obscuration of the true nature of the disease. Mr. J. G., age 43 years, consulted me on Aug. 28, 1926, regarding a very painful left ear. The following history was obtained at that time. During the first week in August the patient was in Atlantic City and one day, following an ocean bath, developed paroxysmal pains in left ear. He immediately returned home and consulted a physician. In the three weeks before consulting me he was seen several times by his physician, but apparently did not obtain relief, and as he himself expressed it, "I am getting worse all the time." He complained of constant pain in left ear, especially over the mastoid region, insomnia, loss of appetite and general malaise. The patient's appearance was indeed of one suffering severe pains; his pallor, sunken eyes and anxious look betrayed a severe illness. Examination of left ear showed the following: Membrana tympani red, angry looking and bulging, especially over posterior superior portion; all landmarks invisible. The entire canal was also inflamed and there was extreme tenderness over the tip of the mastoid, but none over the antrum. Upon incising the eardrum the pus filled the entire canal instantly and reappeared almost immediately following a thorough cleansing, so much so that the patient was compelled to cleanse ear almost every few minutes following paracentesis.

On Aug. 30, two days after paracentesis, the discharge quantitatively was about same. On Sept. 2 I noticed considerable bulging of the drum, so I reincised the eardrum.

Sept. 7, an X-ray taken by Dr. A. M. Sharpe showed the following: "Left mastoid (patient's diseased side), large mastoid area, large mixed cells variety, largest cells being at periphery. Cell trabeculations are well defined at periphery, somewhat hazy surrounding antrum, but none appear to be destroyed." The following day I was greatly surprised to find the entire canal completely closed, due to a swollen and fluctuating mass extending upward from the floor of the cartilaginous portion of the canal. I was unable to pass a probe back of this mass and the patient looked quite ill; there was extreme tenderness over the tip and slight tenderness over the antrum, as well as over the tragus. There was also present a postauricular swelling over tip, extending downward and backward, resembling a Bezold's abscess. The question to decide was whether we were dealing with an acute mastoiditis or a furunculosis, or perhaps a furunculosis complicating an acute mastoiditis. Though I felt certain that it was a case of mastoiditis, a consultation was held on Sept. 10, and after the examination the opinion was expressed that it was a case of furunculosis, for if we were dealing with an acute mastoiditis, the swelling would more likely be in the osseous portion of the canal and not in the cartilaginous. Taking the above fact into consideration, plus the tenderness over the tragus, it appeared quite likely that we were dealing with a case of furunculosis and decided to open the mass in the cartilaginous portion of the canal. I incised the swelling in the floor of the canal and a large amount of pus exuded, then I noticed that by pressing over the tip of the mastoid upward, pus would exude from the wound of the canal. The following few days the patient was practically free from pain, yet his appearance was quite suggestive of one who is still ill. His appearance, combined with marked tenderness over the tip of the mastoid, made me think that we were dealing with a case of mastoiditis.

On Sept. 26, seven weeks since he developed the earache, I noticed the canal almost closed again, due to the swelling extending upward from the floor of the canal, so I advised him to enter the hospital for a mastoidectomy, but he refused.

I reincised the swelling and established further drainage. He gradually improved and the swelling subsided until about three weeks later, when there was only present a small amount of granulation tissue over the original opening. The next day while probing around the opening to find the depth of the cavity, I found the probe sinking into a bony cavity in the direction of the tip of the mastoid. Two days later he again developed a swelling over the tip of the mastoid, resembling a Bezold's abscess, with marked tenderness. I again urged him to enter the hospital, but he suggested another consultation, so I called Dr. Roberts, who advised him to have the mastoid opened. On Nov. 2, the patient was admitted to the Methodist Hospital, and two days later, with the supervision of Dr. Roberts, I operated on him. After making the usual mastoid incision, we found the tip very necrotic, the bone surrounding the antrum was quite healthy, lateral sinus was exposed. There was no doubt in my mind then that the whole pathology was limited to the tip and that the middle ear and antrum were practically free of any pathology. Following the operation the patient made an uneventful recovery. He was discharged from the hospital ten days following the operation and was completely recovered by the middle of December.

DISCUSSION.

Summary: The above was a case of acute mastoiditis where, though the pathology started in the middle ear and antrum, finally limited itself to the tip of the mastoid and perforated into the cartilaginous portion of the canal, giving the appearance of a furunculosis.

DR. BENJAMIN H. SHUSTER: I do not see how a diagnosis of mastoiditis could have been made in the beginning. The pointing was in the cartilaginous portion of the canal and a mastoidectomy at the early stage was hardly justifiable. There was hardly any bone tenderness present, but there was considerable tenderness in the regions where it is usually found in furunculosis. X-ray

reported negative findings. There was nothing to do except incise the swelling in the canal and release the pus. Later when the swelling subsided and the pus continued to discharge, I probed the opening and found the probe slipping into a bony cavity. The presence of mastoiditis in the region of the tip was then apparent.

DR. ROBERT J. HUNTER asked whether Dr. Usset obtained pus from the middle ear cavity. If he did not, then the case resembled one of a type in which the infection comes from the pterygomaxillary fossa and works its way through the fissure of Santorini, appearing in the external auditory canal. Tracing the fistula, he discovered that it was not mastoid in origin.

These cases are often diagnosed incorrectly, being mistaken at times for furunculosis and at times for infections of the middle ear.

Dr. Hunter remembered seeing such cases in paratyphoid fever, parotitis with suppuration, cervical adenitis and infections around the throat.

DR. G. W. MACKENZIE: The report of Dr. Usset's case allows of considerable speculation. Taking in the whole case as reported, I can see the possibility of both conditions—furunculosis and mastoiditis. When Dr. Shuster first saw the case when the cartilaginous canal alone appeared to be involved, it is quite possible that the patient was suffering from furunculosis, together with an uncomplicated middle ear suppuration, for the reason that the X-ray examination of the mastoid was practically negative. Later on mastoiditis developed from the extension of the middle ear suppuration.

It is not so very uncommon for a patient to be affected simultaneously with furunculosis of the canal and middle ear suppuration without mastoid complications, and later develop mastoid complications after the furunculosis has disappeared.

DR. ALBERT L. USSET: I am sorry to disagree with the remarks made by Dr. Dunn, but I am certain that when the patient consulted me first he was suffering from a typical purulent otitis media acute. There was no furuncle in the canal, the drum was red and there was distinct bulging over the posterior superior portion and all landmarks were invisible. After incising the drum there was a profuse discharge. The swelling in the canal appeared two weeks later and I believe that it was a case of mastoiditis from the beginning.

My object in reporting this case is due chiefly to the fact that the symptoms were obscure and for a time simulated a case of furunculosis. Moving the auricle, however, produced no pain, there was no tenderness over the tragus, but distinct tenderness over the tip of the mastoid.

FIRST INTERNATIONAL CONGRESS OF OTO-RHINO-LARYNGOLOGY.

The Congress will be held in Copenhagen from July 30th to August 1st, 1928, under the presidency of Professor Schmiegelow. The following subjects have been arranged for general discussion:

1. "The Modified Radical Treatment of Middle-ear Suppuration," introduced by Professor Tapia (Madrid) and Professor Neumann (Vienna).
2. "Septic Diseases Originating from the Throat," introduced by Professor Ferrari (Rome) and Dr. Uffenorde (Greifswald).
3. "Surgical Diathermy of Malignant Growths in the Upper Air Passages," introduced by Dr. Dan McKenzie (London) and Professor Gunnar Holmgren (Stockholm).
4. "The Anatomical Structure of the Ear and Its Influence on the Course of Suppuration of the Middle Ear," introduced by Professor Mouret (Montpellier) and Professor Witmaack (Jena).

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY AND SECTION ON OTOTOLOGY.

*Joint Meeting with the Section on Otolaryngology of the
Philadelphia College of Surgeons, Philadelphia.*

April 27, 1927

The Influence of Rest on Suppurative Diseases of the Basal Cisterna. Dr. Wells Eagleton.

DISCUSSION.

DR. ROBERT HUNTER: Dr. Eagleton's address was most convincing and encouraging. I listened to it with great pleasure. His researches on the intracranial complications of otitis have made his name a byword when any of these subjects are discussed. He now proposes a definite plan of attack in meningitis, putting surgery on the offensive and giving us renewed hope of some cures. I think if he accomplishes nothing more, he will have done a great thing by stimulating effort along these lines. For many years, we have been content to sit with folded hands and say, "These cases are hopeless. What can we do?" Frankly speaking, the cases of otitic meningitis that I have operated on, which have had a positive culture from the spinal fluid, have all died—and so have those which I did not operate on. Let us try these newer methods. We cannot have worse results than we have had in the past.

However, when we analyze the cases that Dr. Eagleton reports, we find that in the majority of the recoveries, no organism was found in the spinal fluid. Now, recoveries in the past with the watchful waiting policy have all been from this group that we have called meningismus, or protective meningitis. The great difficulty that I find is that when I have a case with no organisms, I hesitate to enter into these more radical procedures. We have all had numerous cases with meningitic symptoms, which cleared up after a simple mastoid. Indeed, an occasional case is seen that gets well with paracentesis only. I had one case that had all the signs of severe labyrinthine involvement a week before I saw him. Lumbar puncture showed 890 cells, mostly polynuclear, no growth. Later punctures showed fewer cells. He got entirely well with no operation. Possibly it was a case of rupture of a sterile abscess into the cerebral spinal system. However, I know that if I had seen that child a week before, when he had fever, intense frontal headache, vertigo, nystagmus, vomiting, sweating and inco-ordination, I would have felt operation imperative. As it is, two years afterward, he is in good health, with good hearing.

How, then, are we to separate the numerous cases that show cells but no organisms in the fluid, that get well after simple procedures, from those that are going to go on to a generalized meningitis? Dr. Eagleton has given us the clue. He has spoken of the importance of little things. We must study the physical signs and symptoms more carefully to determine in which direction the infection is spreading. I would urge the use of the Arcelin position for X-rays of the semicircular canals and internal auditory meatus.

We have been afraid of making these cases worse by operation. I would like to ask Dr. Eagleton how much danger there is of spreading the infection in a case of meningitis which we have diagnosed incorrectly and exposed a part of the brain not involved? How can we form an opinion as to whether localizing meningitis is taking place? My impression is, that the good we may accomplish overbalances the chance of harm. We frequently expose the dura in simple mastoiditis and no meningitis develops.

When, however, we find bacteria in the spinal fluid, we need have no hesitancy in proceeding at once with a vigorous effort to find the focus. It is in these cases that lavage of the cerebrospinal system still has a place. I am not yet ready to abandon it. Evidence points more and more to the fact that the

fluid is the result of osmosis and not a true secretion. There is no definite circulation.

We should not depend upon mere spinal or cisternal punctures. Expose the cerebrospinal system at the point of infection and wash from ventricular, cisternal and lumbar punctures toward that point, being careful to use no pressure. In the posterior fossa cases, expose the cisterna pontis. In anterior fossa cases, expose the cisternal intercerebellaris. Then wash from ventricular and cisternal puncture toward the infection. We have done this in some cases. One case that I had last winter resembled very much the one Dr. Eagleton spoke of tonight. He was brought in unconscious. We did a double radical mastoid but found no leads to the middle or posterior fossae. We then did a ventricular and cisternal puncture with lavage. There was no evident increase of pressure but he improved remarkably for thirty-six hours, apparently due to the lavage. Autopsy showed necrosis of the apex of the petrous bone on the right and left sides. Pneumococci were found in the fluid. In one case with Dr. Gleason and one with Dr. Wood we opened the cisterna pontis and drained. In the former one the progress of the case was delayed.

Our greatest hope in these cases depends on the development of the defensive. Opsonins, precipitins and the other immune bodies do not ordinarily pass into the spinal fluid, but alcohol, chloroform urea and hexamethylenamin do pass in. Investigation to determine how to regulate the permeability of the pia arachnoid to permit natural or artificial curative agents to pass through may lead to some discoveries, as in the instance of massive drainage quoted by Dr. Eagleton in one of his papers. The effect of regulation of pressure on the fluid by the use of salt or by ligation of the carotid must be further studied. Whether the electrolytes are positive or negative has an important bearing on their osmotic properties. A study along these lines may develop some progress, as will a better understanding of colloidal chemistry.

A Consideration Based on Personal Experience of the Various Operative Procedures in the Treatment of Sinus Disease. Dr. Lewis A. Coffin.

DISCUSSION.

DR. ROSS H. SKILLERN (Philadelphia): It certainly warms the cockles of my heart to hear Dr. Coffin, for when I first became interested in the sinuses Dr. Coffin was one of the best known authorities on this subject. I recall the first paper that I ever listened to was delivered by Dr. Coffin on sinusitis in children. Briefly referring to what Dr. Coffin has spoken of, especially with regard to the ethmoid, I agree that the curette is a dangerous instrument, and Dr. Mosher has mostly given it up, and has applied himself to the forceps of the Luc variety or Grünwald as the case may be.

I also agree with Dr. Coffin as to the preference of the Caldwell-Luc procedure over the Denner operation, but ever since I heard of the terrific accident to that man who had a double Denner, getting well; some years afterward he was playing with one of his boys and caught his mouth on the wire clothes line and ripped off the entire alveolus and teeth with the hard palate, so that it fell to the ground, and after that he always had to wear some sort of denture.

Coming down to the operations Dr. Coffin has mentioned: As for the Killian operation, I have given it up. I have given up the old Killian where we cleared out all the anterior wall, etc., and opened up the sphenoid. I gave it up, for one reason, that we don't see cases which require it. I have had recurrences after many years with the Killian operation. I have a patient who for ten years was perfectly well and then came back again with the same condition, which required reoperation, and she has been well again for four or five years now. Dr. Coffin spoke about the operation, that that is the Riedel operation where you take away the entire anterior wall. In old people and where there is a great deal of necrosis, that might be a good operation; but I am inclined to believe that if we have a very deep sinus cavity on that side we will have a horrible deformity . . . the eye will protrude and appear to pop out. There is no doubt about its being the most radical and that if properly done it will cure. Suppose an old man or woman came to me in bad shape with a sinusitis, a patient 65 or 70 years of age, requiring a radical procedure; I would not hesitate to do that operation, for it would give the least shock to

that patient and would offer a cure; and, after all, that is the reason for our recurrences—we don't get apposition of the walls. Invariably below and behind there is always a space remaining which no one could get away from.

Then, you ask, What type of operation would you do? I do an operation which is a modification of the Lothrop operation. Some of you here now were present when Lothrop some years ago gave us a description of his operation on the frontal sinuses. I was asked to open the discussion, which was very cordially received; but in opening that discussion I spoke from the point of the laryngologist, and Dr. Lothrop fussed me up a little when he said we did not see what we were doing when we rasped out the frontal sinus intranasally.

But it was not so bad as that; I merely gave our ideas of his particular operation. "But you have come back to it?" Yes, but we don't do the original operation that Dr. Lothrop described; we don't take away all the intrasinus septum, and a portion of nasal septum, making a hole between the nostrils. That is not necessary to get all the ventilation and aeration required, so that the general surgeon and the laryngologist can sometimes come together and evolve a mutual procedure. In this modified form of operation we have one which will give us quite as much satisfaction in the way of a cure, and also prevent deformity.

I have long ago given up the idea of taking up a certain condition with an invariable remedy; but always try to fit the remedy to the condition, and in that way get the patient well.

SECTION ON OTOTOLOGY.

May 13, 1927.

Results Obtained from the Modified Radical Mastoidectomy in Children and Young Adults (Fourteen Cases Presented). Dr. H. B. Blackwell.

These fourteen cases, as can be seen, are all either children or young adults and have been operated upon during the past year. The duration of discharge in each case was from two to about sixteen years and they illustrate the result it is possible to obtain by performing a conservative operation upon the mastoid in this group of cases in O.M.P.C. The author has performed this operation for fifteen years, but in the past year he has been particularly interested in children and young adults suffering from this condition. My purpose in presenting these cases here was largely to allow the members of the Section the opportunity to test the hearing of each operated ear, and I am sure that those who have done so will bear me out when I say that all can hear a low whisper in the operated ear, and in a few the hearing is almost as good as in the normal ear and also that the hearing in these cases is much better than one could reasonably expect to follow in a similar group of cases where a radical had been performed. At present all have practically dry ears; in two or three there is some slight nonodorous mucus discharge, intermittent and tubal in character and of no particular significance. Three in this series have undergone double operations, both sides simultaneously, or within a week.

To review briefly the operation which I have previously so many times described; a curvilinear incision is made behind the auricle, soft parts of periosteum, cortex removed and antrum opened. The posterior bony canal wall is then taken down, just as in a radical, to the epitympanic ring and that part of the ring removed which corresponds to the section of a circle as illustrated by the dial of a clock from about 9 or 10 a. m. to 3 p. m. The tip is not usually removed and in some instances when the antrum is very large we do not remove the ring. The middle ear structures, drum and ossicles, are not disturbed but are allowed to remain in position. One L-shaped plastic meatal flap is cut and sutured above the temporal fascia. One should endeavor to make the meatal opening on the large side so as to admit as much air as possible to the interior of the wound. The posterior wound is then sutured throughout, light packing introduced into the canal and subsequent to the operation dressed every day per canal. The wound should be dressed daily, com-

mencing the day after the operation. Just as soon as the posterior wound is united firmly, which takes usually about a week, all packing is removed from the canal and no cotton is placed in the meatus and the air is permitted to enter freely the interior of the wound at all times. Excessive granulations should be prevented from forming in the mastoid by means of silver nitrate applications and curetting. By removing the epitympanic ring and taking down the posterior bony canal wall we permit the mastoid cavity, antrum, middle ear and external auditory canal to empty into and form one large cavity, the aeration of which is the most important consideration in securing a happy result. About fifteen years ago, when we first began to report these cases, we defined the operation as a modified radical, to differentiate the procedure from a radical. In recent years the term modified radical has been extended to cover several different procedures for the relief of O.M.P.C., some of which differ as widely from each other as they do from a radical operation. The only essential difference between this operation and a radical is that whereas in the radical the entire tympanum is curetted freely and all of the middle ear structures, including drum and ossicles, are removed with a resulting impairment of hearing. In this procedure, which we recommend, the middle ear structures are not removed but are allowed to remain in position, with a resultant gain in hearing. The operation has often been confounded by the one recommended by Mr. Heath; the procedure have nothing in common, as one can readily see by reading Mr. Heath's original monograph on the subject.

We feel that cases of O.M.P.C. are in reality those of chronic mastoiditis, the mastoid cells of course gradually disappearing during the course of the infection, the entire mastoid process undergoing rarefaction and condensation, becoming hard and dentigenous, with almost a complete loss of cells. In these cases, however, whenever the antrum is opened there is discovered a comparatively large cavity, usually filled with granulations, detritus, pus, etc., which constantly drains through the middle ear into the auditory canal, immediately adjacent to this nidus of infection existing in the antrum space are important structures, such as the external semicircular canal, knee of the sinus and dura of middle fossa, subject to direct infection. In order to insure the patient against the development of serious intracranial complications, which may of course develop at any time during the course of O.M.P.C., it is necessary to permanently aerate and drain the antrum region. It can be done just as readily by the operation which we recommend as though a radical had been performed. It has been our experience that when once the middle ear has been relieved as acting as a way station for pus and inflammatory products proceeding from the antrum to the outside air it recovers comparatively quickly, even though the discharge had been present for years and the subsequent healing of even large perforations.

Dr. T. J. HARRIS: I only wish to do what I have before done on various occasions—congratulate Dr. Blackwell on the wonderful results he has gotten in these cases presented tonight. I am one of those who have felt very strongly the need of avoiding the radical operation when possible. Certainly, the results Dr. Blackwell has shown are very wonderful. I would be glad if in closing the discussion Dr. Blackwell will again state a few of the points in the operation.

Congenital Nystagmus in Conjunction with Double Masteoidectomy and Cerebellar Symptoms. Dr. Marvin F. Jones.

Patient M. L., born Oct. 30, 1922; age 4 years, 4 months; was admitted to the Post-Graduate Hospital, March 10, 1927; born, Russia.

Family History: Two cousins with spontaneous congenital nystagmus. Child born in nine months, normal labor, weight at birth 8 pounds, 4 ounces. Normal development. Talked at 12 months. Had measles at 2 years of age. Has had sore throats and recurrent discharge from the ears, adenoids and tonsils.

The principal complaint when first examined was discharging ears, with a fever. Soon after this, the right ear was incised. Both ears have discharged since that time and patient has been running temperature. The degree of the temperature was unknown to the mother.

At the time of admission to the hospital, he was admitted as double mastoiditis, with rather marked impairment of hearing. At that time the examina-

tion showed horizontal slow nystagmus to the right and left, rhythmical, with long oscillations. This was constant; typical symptoms of bilateral mastoiditis. Tongue was coated and tonsils enlarged and inflamed.

Examination of the abdomen showed an enlarged spleen and slightly enlarged liver. Reflexes were exaggerated, with the right more pronounced than the left. Questionable Babinski; cervical and inguinal glands enlarged. There was an eczematous eruption around the buttocks.

Neurological examination March 10, 1927.

Child has horizontal nystagmus with a rapid component to the right. Muscles of the right upper and lower extremities show increased tone and the deep reflexes on the right are more active than on the left. There is a positive Babinski on the right. The abdominals are less active on the right than on the left. Romberg is negative. There is no ataxia on walking. These findings and symptoms are best explained, I think, by an epidural irritation on the left side, due, no doubt, to advanced mastoid destruction. Neurological examination by Dr. Sherwood.

Ophthalmic Examination: Disc margin well defined; no evidence of papillitis or papilledema.

Operation: Mastoidectomy, bilateral, performed March 10.

Progress note, March 14, 1927: Condition of mastoid wound satisfactory; two clips removed on either side; nystagmus present and fully as active as previously.

Progress note, March 25, 1927: Mastoid wounds in excellent condition.

Examination of the eyes March 29, 1927.

On March 29 there was a slight irregularity in the temperature curve, going as high as 100° on March 30.

Consultation slip was sent to Dr. Alger for the eye examination. Media clear, fundi normal, nystagmus prevents satisfactory fundi examination. Nystagmus resembles the congenital central type. I examined the case the same time as Dr. Alger and found a tendency to fall to the right on walking, a marked atonia of the right arm, and diadokokinesis of the right side, and posture position of the head tipped to the right. Reflexes: a distinct Babinski of the left side, an increased patellar reflex, markedly diminished abdominal reflex left, achilles exaggerated.

Child was discharged from the hospital April 5, 1927; reflexes normal.

The urine examinations were persistently negative except for calcium oxalate crystals and occasional epithelial cells.

The blood count on March 11, 1927: Leucocytes 11,800; polynuclears 70, lymphocytes 29.

Bacteriological examination of swab from right mastoid for culture.

Diagnosis: *Streptococcus viridans*.

Test for syphilis negative.

Blood count, March 23, 1927: Leucocytes 9,800, polynuclears 79, lymphocytes 19.

Since leaving the hospital, this case has progressed favorably and at present has two healing mastoid wounds. On inquiry of the mother, it was discovered that two members, cousins, have the same type of eye movement. There has been a history of intermarriage.

The particularly interesting feature of this case was the combined appearance of dural irritation, spontaneous nystagmus and ataxia, with a case of double mastoiditis. The neurological symptoms resolved spontaneously, the nystagmus has persisted.

Luetic Basilar Meningitis, with Double Facial Nerve Paralysis. Dr. Marvin F. Jones.

Mr. S. P., admitted Post-Graduate Hospital, March 26, 1927, with the complaint of paralysis of the left side of face and weakness of both legs.

One month ago the patient began to have headaches. This was followed by drooping of the left eyelid, which became complete in three days. Nausea and vomiting for one week later. Gradual development of a left facial paralysis, which became complete about two weeks before admission. The weakness of both legs has been of three weeks' duration.

The family history was negative. Past history: A rheumatic attack, with shooting pains in both legs; occasionally a sensation of something crawling over the legs, and an ear condition described below; otherwise negative.

Present Condition: Complete left facial paralysis, no pain and not acutely ill.

Eye Examination: Ptosis of the left eyelid, left pupil does not react to light and is slightly irregular. Right pupil reacts slightly to light, corneal anesthesia right, second degree spontaneous nystagmus to the right, which is noticeable in the right eye, paralysis of the superior rectus, the inferior rectus, the internal rectus, superior oblique and inferior oblique muscles of left eye.

Ear Examination: Deafness in the right ear; small perforation of membrane tympani, superior and anterior, through which a probe was passed for a small distance along a sinus directed upward and forward. Ear dry at present time. The history has been of a discharging ear during the war for three months; this was about ten years ago.

Left Ear: No spontaneous past pointing with either hand; irrigation with water at 68° and after forty seconds this produced a horizontal nystagmus to the right, which was of about twenty seconds' duration. There was no reaction from the horizontal canal. He had a dizzy sensation, but no past pointing following irrigation. The high tone limits were reduced; the low tone limits elevated; the bone conduction reduced and the Weber referred to the right ear. Whispered and spoken voice not tested.

Nasal examination was negative.

Mouth: Tongue slightly coated and deviated to the right. A weakness of the soft palate of the right side; tonsils not remarkable; pharynx negative.

Neurological examination shows a positive Romberg, with a falling to the right; ataxia on the right side; heel to knee test very ataxic on the right; toe to object above the patient, right ataxic, left normal. Heel to knee along shin, ataxic on the right, left normal; adiedokokinesis on the right, absent on the left.

Reflexes: Biceps, triceps, radials, superpatellar and patellar more active on the right than on the left; abdominal reflexes less active on the right. Questionable Babinski on both sides. Pain and temperature normal, pain and tendon muscle sense normal.

Consultation slip was sent to the Otological Department immediately after a spinal puncture had been taken and a note that the findings would be unreliable following this procedure and that the examination would be attempted at a later date was made on the chart. This consultation slip was sent to determine if the eighth nerve had been involved and if the seventh was secondary to the ear condition or a part of the general findings. From the functional tests it was decided that the eighth nerve was involved.

Laboratory findings were as follows: Repeated urinalyses were negative; colloidal gold reaction on spinal fluid was prevented by the number of red blood cells present. Complement fixation test for syphilis on the blood was positive; complement fixation test for syphilis on the spinal fluid was positive.

X-ray examination of the skull was negative.

Blood examination for white and differential was negative.

Diagnosis was made by the Neurological Department of the Post-Graduate Hospital, to which department we are indebted for the privilege of seeing and presenting this case of luetic basilar meningitis involving the third, fourth, upper division of the fifth, seventh, eighth and possibly the twelfth nerves. Under antiluetic treatment the patient has improved.

PROF. GEORGES PORTMAN (Bordeaux, France): I examined these patients, and if I have correctly understood the operation it is possible that it will prove of great economic value. I was very much pleased to see the splendid results obtained by Dr. Blackwell.

(To be continued.)

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